In search of good watergovernance

An exploration of watergovernance arrangements abroad

Final Report

Ministerie van Verkeer en Waterstaat
DG Water

May 2008
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0 DUTCH SUMMARY

0.1 Inleiding

Voor u ligt het eindrapport van een verkenning van vormen van watergovernance buiten Nederland. RWS Waterdienst is de opdrachtgever voor het onderzoek. Op verzoek van DG Water van het Ministerie van Verkeer en Waterstaat gaf de Waterdienst de volgende doelstelling aan de onderzoekers mee: zoek naar inspirerende voorbeelden in het buitenland van de wijze waarop de bestuurlijke organisatie van het waterbeheer en beleid functioneert. De verkenning is vooral een zoektocht naar opvallende vraagstellingen en aanpakken in het buitenland, en biedt het kader om op een aantal zaken meer systematische, in de governance theorie verankerderde vergelijkende studies aan te vatten.

De verkenning is uitgevoerd door onderzoekers van DHV, Grontmij en Indiana University. Om de verkenning te verbinden met de bestaande wetenschappelijke inzichten over watergovernance heeft een wetenschappelijke commissie onder leiding van hoogleraar Bestuurskunde, prof. Geert Teisman het onderzoek begeleid.

De verkenning is in 3 ronden uitgevoerd. In ronde 1 zijn de hoofdkenmerken van de bestuurlijke organisatie van het watersysteem in 14 landen binnen en buiten Europa geïnventariseerd (zie voor een overzicht van landen de Engelstalige hoofdtekst.) Uit de brede inventarisatie hebben onderzoekers, opdrachtgever en begeleidingscommissie vraagstellingen en aanpakken geselecteerd, die hen het meest opvielen. In ronde 2 zijn 8 landen verder uitgediept waarbij vooral is gezocht naar voor Nederland interessante manieren van doen en wijzen van organiseren. Daarbij is gefocust op 5 thema's:

1. waterbewustzijn en publieke participatie;
2. regionale samenwerking tussen autoriteiten;
3. mate van integratie tussen beleidsvelden water en ruimtelijke ordening;
4. invloed van private partijen op het beleidproces;
5. financieringswijzen van waterbeleid.

De onderzoekers, opdrachtgever en begeleidingscommissie kozen deze vijf thema's op basis van huidige ontwikkelingen in het waterbeheer in Nederland. De thema's sluiten aan bij de Watervisie van het kabinet "Nederland veroveren op de toekomst" welke in de zomer van 2007 is uitgekomen.

In ronde 3 zijn deze thema's voor vier casus in vier verschillende landen uitgewerkt. De vraag daarbij was hoe deze landen zich beschermen tegen overstromingen, terwijl ze qua governancebenadering uit verschillende tradities komen. Er is voor het onderwerp overstromingsbescherming gekozen om pragmatische redenen. Ten eerste omdat dit thema in alle geselecteerde cases voorkomt en goed onderzoekbaar bleek. En ten tweede omdat de eerder geselecteerde 5 thema's binnen dit onderwerp ruimschoots aanbod komen.

De vier landencasus zijn:

1. *Zürich*: meerdere stroomgebieden in het Kanton Zürich in Zwitserland;
2. *Loire*: het stroomgebied van de Loire in Frankrijk, dat meerdere Franse “Régions” en “Départements” omvat;
3. *Engeland*: meerdere stroomgebieden in Engeland;
4. *Louisiana*: het stroomgebied van de Mississippi in Louisiana, Verenigde Staten; in het bijzonder New Orleans en omstreken.

Deze casus komen uit landen met verschillende governancetradities. Zwitserland en Frankrijk hebben een meer collectieve traditie waarbij de staat verantwoordelijkheid en keuzevrijheid van het individu overneemt, terwijl Engeland en de Verenigde Staten meer bekend staan om hun traditionele aandacht voor individuele verantwoordelijkheid. Frankrijk en Engeland hebben daarbij weer een meer statelijke of nationale-overheidgerichte traditie, terwijl de Verenigde Staten en Zwitserland meer nadruk leggen op de eigen legitimiteit van en financiering door de lagere overheden. De Nederlandse vorm van watergovernance bevindt zich daar tussenin. Er is in Nederland staatssturing via het Ministerie van Verkeer & Waterstaat en Rijkswaterstaat, terwijl er daarnaast ook een sterke rol is voor regionale autoriteiten zoals provincies en waterschappen. Er is een collectieve traditie waarin watertaken een verantwoordelijkheid is van de overheid, terwijl de geluiden om ook anderen mede verantwoordelijk te maken wel gehoord worden. In dat licht bieden de vier casus ijkpunten voor het veld waarbinnen watergovernance in Nederland zich kan verder ontwikkelen.

0.2 Methodologische beperkingen van deze studie

In deze studie is verkend hoe andere landen hun watergovernance organiseren en managen, hoe hun aanpak werkt en of dat in deze landen voldoende bevredigende resultaten oplevert. Zulke voorbeelden kunnen inspireren tot reflectie op de vraag of deze aanpak in Nederland toepasbaar is. De feitelijke toepassing hangt vervolgens weer sterk af van de context in Nederland zelf. De Nederlandse context is in deze opdracht niet met diepgang onderzocht. Over toepassing worden dan ook geen uitspraken gedaan, te meer niet omdat het één op één kopiëren van praktijken niet zomaar mogelijk is of tot ongewenste resultaten kan leiden (De Jong, 2001; Hemerijck & Visser, 2001).

Op basis van een brede scan zijn sleutelspelers en waterexperts uit de vier casuslanden met overzicht over de materie geïnterviewd. Deze interviews completeren en richten de door ons uitgevoerde deskresearch. Door de brede scope van de studie en het verkennende karakter ervan heeft er geen aselecte steekproefselectie kunnen plaatsvinden, zijn er geen hypothesen vooraf geformuleerd en heeft er geen uitgebreide triangulatie plaats gevonden tussen verschillende percepties binnen een casus.

De casus geven een goed beeld van de werking van het watergovernancesysteem in de casuslanden. Voor een antwoord op de vraag waarom het watergovernancesysteem zich zo heeft ontwikkeld en hoe het vervolgens in detail werkt is evenwel nadere analyse nodig, evenals voor de vraag of bepaalde praktijken uit het buitenland door Nederland overgenomen kunnen worden.

De informatie uit de casus maakt echter wel duidelijk hoe belangrijk bestuurlijke verhoudingen en de rol die het waterbelang daarin speelt, zijn voor het zichtbare beleidsspel dat ontstaat en de uitkomsten die dat oplevert.

0.3 Conclusies en inspiratie voor Nederland

Uit de casus zijn conclusies getrokken aangaande de vijf geselecteerde thema's waterbewustzijn, regionale samenwerking, integratie ruimtelijke ordening en waterbeleid, invloed private partijen en financiering.

0.3.1 Waterbewustzijn en publieke participatie

Conclusies

In drie casus – de uitzondering is het Zwitserlandse kanton Zürich – achten de waterdeskundigen in of buiten de overheid het nodig het maatschappelijke en individuele waterbewustzijn (over overstromingsrisico's, de gevolgen en hoe daarmee om te gaan) te vergroten. In Zwitserland blijkt uit de casus dat er al een hoog bewustzijn is en dat het governancesysteem mede op basis hiervan functioneert. Overigens werken ook in deze casus zowel het Kanton en de gemeenten aan het waterbewustzijn. De werkwijze is echter eerder gevolg van de gekozen beleidsinstrumenten dan een zelfstandig doel. In alle casus worden diverse benaderingen ontwikkeld om risico's transparant te maken voor anderen dan de waterautoriteiten zelf. Enkele voorbeelden zijn: een waarschuwingsysteem tegen overstromingen per SMS, risicokaarten op internet (toegankelijk per postcode), en verplichte transparantie over geldende risico's bij onroerendgoedtransacties.

Een belangrijk dilemma in governancetermen is de vraag of een risico tot maatschappelijk of individueel bewustzijn en verantwoordelijk gedrag moet leiden. In landen waar een collectieve verantwoordelijkheid en governancearrangement meer centraal staat aangaande veiligheid, zoals in de casus Loire en Zürich, ligt de nadruk op collectieve antwoorden. In landen waar de verantwoordelijkheid voor veiligheid meer bij het individu wordt gelegd, zoals in de casus Engeland en Louisiana, komen arrangementen die private partijen en individuen faciliteren om met risico's om te gaan eerder van de grond.

Beide arrangementen hebben voor- en nadelen. Wanneer een collectieve voorziening beschikbaar is, blijkt het individuele bewustzijn naar de algemene verwachting van sociale wetenschappers lager dan wanneer deze ontbreekt. In de praktijk blijkt echter dat er in Engeland en Louisiana mensen zijn die er voor kiezen om zich niet te wapenen tegen de risico's (bijvoorbeeld met een verzekering), terwijl zij zich er wel van bewust zijn. De experts in deze casus pleiten dan ook voor het invoeren van een arrangement dat de veiligheid van een stroomgebied op basis van collectiviteit organiseert. Dit omdat mensen (kennelijk) tegen hun eigen korte termijn kortzichtigheid (namelijk het *niet* kiezen voor bescherming omdat dit goedkoper is) beschermd moeten worden. Een dergelijk soort arrangement staat dichtbij de Nederlandse situatie voor veiligheid, waar we in Nederland een sterke collectieve benadering kennen. Echter het vergroten van individueel bewustzijn van risico's in buitendijkse gebieden zou voor de Nederlandse situatie wel nadere studie kunnen uitlokken. Mensen hebben het recht om in gebieden te wonen met een hoge kans op overstroming, maar moeten zich dan wel daarop voorbereiden (door drijvende huizen, ontruimingssystemen, verzekeringsarrangementen en zo verder).

In Nederland staan de collectieve veiligheidsvoorzieningen ten opzichte van de onderzochte casus op een hoog niveau. De legitimiteit ervan is hoog (hoewel dit bij overlastproblematiek minder helder is). Het collectieve waterbewustzijn in Nederland lijkt te vergelijken met Zürich. Burgers zijn zich meestal bewust van risico's van water maar laten de beheersing van deze risico's over aan de overheid. Als er schade wordt veroorzaakt is er een voorkeur voor collectieve verzekering op basis van solidariteit. Toch bieden ook Louisiana en Engeland belangrijke informatie voor het geval de legitimiteit van de overheid bij het borgen van de waterveiligheid in Nederland zou afbrokkelen en eigen verantwoordelijkheid meer op de voorgrond komt te staan. Deze casus wijzen er namelijk op dat collectieve voorzieningen moeilijk van zelf

ontstaan en dat individuele vermogens om met risico's op stroomgebiedsschaal om te gaan beperkt zijn om een voldoende veilige situatie te laten ontstaan. Dit wordt veroorzaakt doordat individuen de inschatting maken dat het op korte termijn goedkoper lijkt om het risico te negeren.

Inspiratie voor Nederland
De casus laten zien dat het mogelijk is om op individueel niveau waterbewustzijn te vergroten en verantwoordelijkheden neer te leggen. Het bewustzijn is het sterkst als de prikkels (incentives) om met waterrisico's om te gaan op individueel niveau aangrijpen. Er zijn echter ook beperkingen. Hoewel het bewustzijn sterker is, blijkt dat dit niet automatisch tot handelen leidt (Louisiana en Engeland). Wel laten de onderzochte casus creatieve manieren zien waarop bewustzijn vergroot kan worden. In de Nederlandse situatie kunnen deze voorbeelden inspiratie opleveren voor bijvoorbeeld het omgaan met wateroverlast, waarbij een individueel handelingsperspectief denkbaar is. De andere kant van de medaille is echter dat het niet nuttig zal blijken om het *individuele* waterbewustzijn te vergroten als een handelingsperspectief op individueel niveau ontbreekt, zoals in Nederland het geval is bij bescherming tegen grootschalige overstromingen. In dat geval is het logischer om een collectief waterbewustzijn te ontwikkelen en vanwege het (soms) uitblijven van individueel handelen (terwijl er wel bewustzijn is) tevens een collectieve voorziening te treffen. In de Nederlandse situatie is een collectieve aanpak geborgd tegen vervluchtiging doordat het functionele waterbeheer is geïnstitutionaliseerd. Daardoor is het waterbelang gedepolitiseerd geraakt en is het vanzelfsprekend geworden dat er collectief maatregelen worden getroffen. Het vergroten van het collectieve bewustzijn is nodig om de legitimiteit van deze aanpak voor de langere termijn te garanderen.

0.3.2 Regionale samenwerking tussen verantwoordelijke autoriteiten

Conclusies
In alle casus zijn de verantwoordelijkheden voor de bescherming tegen overstromingen verdeeld over verschillende overheden. In bestuurskundige termen uitgedrukt: watergovernance is multi-level governance met een diversiteit aan samenwerkingsvormen rondom (deel)stroomgebieden. In alle casus blijkt de vereiste samenwerking tussen overheden een belangrijk strijdpunt (ook over de financiering van waterkeringen). Klassiek is het bestuurlijke spel tussen regionale ruimtelijke autoriteiten en waterautoriteiten die in alle casus centraal georganiseerd zijn maar vaak een gedeconcentreerde organisatievorm kennen. Samenwerking tussen de ruimtelijke autoriteiten ontstaat in alle casus vanzelf bij ontbreken van functioneel waterbestuur met een stroomgebied als natuurlijke grens. We komen daar nog specifiek op terug. Ook blijkt in de casus het waterbewustzijn en de waterexpertise van gemeenten beperkt. Daar waar blijkt in de casus dat wateroverlast in de stad een opkomend probleem is waarop gemeenten (nog) geen antwoord hebben, dient zich wel een belangrijk vraagstuk aan van watergovernance.

Kanton Zürich lijkt een uitzondering. Een uitgekiende combinatie van risicozonering (die ruimtelijk wordt gehandhaafd), collectieve schadeverzekering en individuele maatregelen aan gebouwen (op basis van bouwvoorschriften) lijkt tot een bevredigende situatie te leiden.

Inspiratie voor Nederland
Bouwvoorschriften voor gebieden die met enige regelmaat onderlopen, zoals in Zürich lijkt als idee het overwegen waard. In de andere casus worden oplossingen op een hoger abstractie- of schaalniveau gezocht, maar dit lijkt niet slagvaardiger dan de Zwitserse aanpak.

In alle casus wordt de aansluiting van gemeenten als problematisch ervaren. Dit komt overeen met de Nederlandse situatie waarin veel waterbeheerders aangeven dat zij gemeenten sterker betrokken willen

zien. De budgetten van de waterschappen in Nederland zijn echter veel zekerder dan in de onderzochte casus. Dit lijkt een belangrijke oorzaak dat de positie van de waterschappen ten opzichte van gemeenten en provincie sterker en effectiever is dan elders. De verdeling van verantwoordelijkheden in Nederland is helderder dan in de vier casus. Dit lost het probleem van de aansluiting bij gemeenten echter niet op. Het blijft zaak te zoeken naar efficiënte vormen van samenwerking. De menselijke factor lijkt daarbij voorop te staan, hoewel verziekte bestuurlijke verhoudingen, zoals in de Franse casus het geval is, natuurlijk niet helpen.

0.3.3 Mate van integratie tussen beleidsvelden water en ruimtelijke ordening

Conclusies
Behalve in Zürich, blijken er overal nieuwe ruimtelijke ontwikkelingen in risicovolle gebieden plaats te vinden. Water is in deze casus zeker niet sturender voor ruimtelijke ontwikkelingen dan in Nederland. In Louisiana (een casus die overigens niet typisch is voor de gehele VS) zijn er zelfs geen formele planprocedures om bij ruimtelijke ontwikkeling rekening te houden met waterrisico's. In de andere twee casus is dit wel het geval. De effectiviteit van deze planningssystemen is niet geheel te achterhalen (wellicht is er een preventief effect, dat is echter moeilijk meetbaar). Wel kan gezegd worden dat er sprake is van een grote bestuurlijke drukte door versnippering en dat het nemen van verantwoordelijkheid voor waterrisico's snel weer vervluchtigd doordat het belang niet is geïnstitutionaliseerd. Alleen in Zürich is de verantwoordelijke waterbeheerder (het Kanton) tevreden over het systeem; het Kanton stelt hier zoneringregels op die dwingend zijn voor gemeenten en deze houden zich er ook aan. In Loire en Engeland is er alleen sprake van verplichte transparantie van waterrisico's van plannen.

Er zijn aanwijzingen dat de bestuurscultuur meer bepalend is voor de effectiviteit van planningssystemen dan de formele structuur ervan. Binnen deze studie is het niet mogelijk geweest deze aanwijzingen volledig te onderzoeken. Wel zien we in de meeste casus dat de centrale overheid worstelt met de wijze waarop ze lagere overheden eigen ruimtelijke afwegingen moeten en kunnen laten maken, die gunstig uitpakken op het hogere niveau van stroomgebieden. Als we de casus rangschikken in volgorde van afnemende effectiviteit van ruimtelijke planningssystemen dan zien we voorlopig het volgende beeld: Zürich, Engeland, Loire. Louisiana is hier buiten beschouwing gelaten omdat het geen formeel instrument heeft dat waterrisico's koppelt aan ruimtelijke ordening.

Inspiratie voor Nederland
De wijze waarop het ruimtelijke planningssysteem werkt, lijkt een sterkere verklarende factor voor de tevredenheid met de koppeling tussen ruimtelijke ordening en waterrisico dan transparantie en waterbewustzijn. De worsteling van veel centrale overheden met het realiseren van een effectief planningssysteem (procedure) is ook in Nederland bekend. Verplichte risico-evaluaties voor nieuwe ruimtelijke ontwikkelingen (zoals de watertoets) in combinatie met een risicozonering wordt door velen gezien als een belangrijk onderdeel van de wijze waarop met overstromingsrisico's moet worden omgegaan. Daarmee is echter nog geen proactieve rol op ruimtelijke ontwikkeling en gebiedsontwikkeling gerealiseerd. In Nederland is de wijze waarop voor het waterbelang wordt opgekomen geïnstitutionaliseerd in de waterschappen als functioneel bestuur. Dit leidt ook tot bestuurlijke versnippering bij ruimtelijke processen, maar niet meer dan wanneer er geen functionele bestuurslaag is. Het voordeel van een functioneel waterbestuur is tegelijkertijd dat er wel een partij is die voldoende gelegitimeerd is om waterbelangen in ruimtelijke besluitvorming te agenderen. In deze zoektocht biedt het buitenland geen voorlopers, de situatie in de casus is zelfs moeilijk te vergelijken met de Nederlandse. Wel is de Zwitserse casus interessant. Het is de moeite waard om nader te onderzoeken wat de oorzaken zijn dat de gemeenten binnen het Kanton Zürich de ruimtelijke voorschriften van het Kanton volgen.

In Nederland kennen we naast de ruimtelijke planning ook de mogelijkheid om voor primaire keringen centraal in te grijpen. Het Nederlandse systeem lijkt daarmee tot hogere niveaus van veiligheid te leiden. Voor wateroverlast lijkt Nederland op de andere casus. De gemeenten zijn verantwoordelijk en waterschappen hebben een belangrijke adviserende rol. Verschil is dat in de buitenlandse casus de adviserende rol vaak is weggelegd voor een gedeconcentreerde rijksdienst. Het lijkt daarom onwaarschijnlijk dat centraliseren van waterbeheertaken helpt om de ruimtelijke afwegingen te verbeteren. Daarbij komt nog eens dat Nederland al de mogelijkheid heeft om voor primaire keringen centrale regie te voeren. Door de combinatie van multi-level governancearrangementen lijkt Nederland een hoger niveau van veiligheid te realiseren dan elders.

0.3.4 Invloed van private partijen op het beleidproces

Conclusie

In alle casus zijn verzekeringen van onroerend goed belangrijk onderdeel van het governance-arrangement. Hierdoor hebben private verzekeringsmaatschappijen mede invloed op beleidsafwegingen. Ook speelt het mee met private koopbeslissingen, vanwege de premiehoogte die gedifferentieerd is naar het geldende risico. In Engeland is de verzekering het enige echte vangnet. In dit vangnet zitten echter mazen. Niet alle woningen zijn verzekerd. Gemiddeld is 78% van de huishoudens verzekerd maar in sommige – zelfs overstromingsgevoelige – gebieden is dit slechts 25%. Ook in Louisiana blijken er mensen zich niet te verzekeren. Hoewel een verzekering verplicht is om een hypotheek te kunnen afsluiten, laten veel mensen de verzekering na een paar jaar verlopen (exacte cijfers zijn niet bekend). Mensen verzekeren zich niet omdat de federale staat in geval van grote catastrofes schadevergoedingen uitkeert. Daarnaast is er een “racial issue”: arme mensen wonen op risicolocaties en wanneer er voor hen speciaal een (collectief / preventief) veiligheidsbeleid zou worden gevoerd dan creëert dat een precedent. De aandacht verschuift daarmee meer naar het snel genezen dan het voorkomen van de kwaal. Dit komt misschien ook omdat Amerika bekend is met het fenomeen van de tornado’s, waar vrijwel niets tegen te doen valt, behalve schuilkelders bouwen en herbouw van de (veelal houten) woningen.

In Frankrijk lijkt de verzekering ongewenste neveneffecten te hebben vanwege het verplichte karakter en het ontbreken van premiedifferentiatie naar veiligheidsniveau. Iedereen betaalt, ook mensen die geen risico lopen. Waardoor een incentive ontbreekt om in veiliger gebieden te gaan wonen of aanvullende maatregelen te nemen.

De vraag is of meer private bemoeienis leidt tot beter omgaan met risico’s. In Engeland en Louisiana blijkt het instrument van verzekeren het vermogen van de gemeenschap om met risico’s om te gaan niet te vergroten. Er is zelforganisatie nodig om tot een bepaalde en effectieve collectiviteit te komen en deze komt onvoldoende van de grond. In situaties waarin een collectiviteit verantwoordelijkheid neemt voor de veiligheid (zoals in Nederland in de vorm van waterschappen; in feite toch ontstaan als coöperaties van boeren en burgers in een polder) lijkt het bestuurlijk vermogen, en dus de veiligheid, groter.

Wordt de (collectieve) verzekering gecombineerd met incentives op individueel niveau (ter vergroting van de veiligheid) en een regulerend ruimtelijke-ordeningssysteem, zoals in Zürich, dan lijkt het vermogen om met watervraagstukken om te gaan groter, leidend tot gewenste niveaus van veiligheid. Hier echter is de verzekering wel een collectieve verzekering waar iedereen aan meebetaalt zelfs boven het niveau van het Kanton.

Inspiratie voor Nederland

Ook in Nederland spelen individuele verzekeringen een rol, het betreft dan schade door overlast door regenwater in de opstalverzekering. Echter schade door het breken van een primaire kering wordt door de

overheid vergoed. Dit is logisch omdat de overheid deze verantwoordelijkheid ook op zich heeft genomen, getuige de wettelijke veiligheidsnormen waaraan keringen dienen te voldoen. Dit systeem lijkt vooralsnog goed te werken en het bestuurlijk vermogen ten aanzien van waterveiligheid is in Nederland is veel groter dan in Engeland, Loire (met name de steden Tours en Orléans) en Louisiana.

Wel is het interessant om te zien dat Nederlandse verzekeraars in de toekomst wellicht druk zullen uitoefenen op gemeenten en waterschappen als maatregelen tegen overlast onvoldoende blijken. In Engeland blijken verzekeraars immers een invloedsfactor die overheden aanjaagt om maatregelen te treffen. De situatie in Zürich is leerzaam vanwege de combinatie van verzekeren en bouwvoorschriften. In Loire en Louisiana spelen de nationale staten een dominantere rol bij het verzekeren van waterrisico's en zijn private partijen hooguit in uitvoerende zin betrokken. In de Verenigde Staten zijn er wel veel ideeën hoe dat beter zou kunnen.

Nu in Nederland wordt bezien of een meer publiek-private gebiedsontwikkeling wenselijk is, dient nader onderzocht te worden of en hoe private ontwikkelaars en beheerders een rol kunnen spelen in het omgaan met lokale wateroverlast. We hebben in de casus echter weinig aanwijzingen gevonden hoe hieraan invulling te geven. Ook hier lijkt Nederland zijn eigen pioniersrol te moeten spelen

0.3.5 Financieringswijzen van waterbeleid

Conclusies
In geen van de casus blijken waterautoriteiten belasting te mogen heffen (behalve in Engeland, de lage belastingen zijn echter onvergelijkbaar met die in Nederland). In alle casus is de financiering van maatregelen afhankelijk van algemene budgetten en dus onderhevig aan politieke debatten. Dit leidt in bijna alle casus tot onstabiele budgetten en tekorten om geplande maatregelen te realiseren. Daarbij zijn tevens de budgetten in de casus waarbij de verantwoordelijkheid aan het individu wordt overgelaten (Louisiana en Engeland) relatief lager dan wanneer er een collectieve verantwoordelijkheid wordt genomen. Daar staat dan tegenover dat de belastingdruk lager is.

Daarnaast worden in de casus verschillende vormen van cofinanciering gehanteerd. Soms ontstaat er door cofinanciering een patstelling tussen betrokken overheden, zoals in Louisiana. In de Loire-casus echter blijkt cofinanciering gewenste samenwerking tussen overheden te ontlokken. In Engeland blijkt het effect klein, waarschijnlijk door de kleine budgetten. De effectiviteit van de co-financieringsarrangementen lijkt meer bepaald door de bestuurlijke context dan door de formele aspecten.

Inspiratie voor Nederland
Het Nederlandse systeem om de aanleg en het beheer van de primaire waterkeringen te financieren vinden we in de casus niet terug. Een politiek debat over het benodigde budget ten opzichte van andere prioriteiten komt in Nederland in beperkte mate voor. Het veiligheidsniveau in Nederland ligt hoger dan in de onderzochte casus. Nederlanders lijken meer en vanzelfsprekender geld over te hebben voor veiligheid dan elders. Het collectieve waterbewustzijn lijkt (nog) hoog. Een tragedy of the commons zoals in Engeland en Louisiana, is nog ondenkbaar.

Cofinanciering is ook in Nederland een gebruikte werkwijze bijvoorbeeld voor de synergiegelden bij NBW en Kaderrichtlijnwater. Het is zaak om co-financieringsarrangementen zowel te bezien op hun potentiële ongewenste neveneffecten (soms is het middel erger dan de kwaal) als op hun faciliterende effecten om partijen te verleiden samen te werken.

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1 INTRODUCTION

1.1 Pretext

Attention for water management is rising all over the world. In The Netherlands, tens of thousands of professionals are organized to make water safer, cleaner and available. How can Dutch professionals be inspired by approaches in other countries? This wide-ranging question was asked by Rijkswaterstaat Waterdienst (the National Centre for Water Management), at the request of the Ministry of Transport, Public Works and Water Management, and answered by DHV consultants with the help of Grontmij and Indiana University under guidance by a committee with members from the academic world, led by prof. of public administration Geert Teisman (a list of the members of this committee is stated in appendix two). This final report reflects its findings.

1.2 Limitations of this study

Water is a common pool resource – a resource that many can use without suffering the consequences of that use, if nothing is organized to prevent irresponsible behavior (e.g. Ostrom, 1990). The initial focus was on the question what other countries do to organize the management of common pool resources, in particular surface water, how that works in practice and if that is satisfactory to these countries and inspiring to other countries. During this study we further focused our research to flood risk management within the theme of surface water. In this respect it is important to note that area's that are safeguarded from flooding also can be seen as a common pool resource.

Whether such examples of water governance also would be inspiring for The Netherlands depends on the Dutch context, which was not investigated in detail. In general, great care is necessary when countries try to copy systems from other countries (De Jong, 2001; Hemerijck and Visser, 2001). In a next stage further analysis may be done.

Within the broad scope (when starting this study) it wasn't possible to do extensive and in depth research for example doing multiple interviews with involved actors. Instead a desk research was done which is complemented by interviewing local experts on water governance and some involved actors within the cases. As a consequence an in depth analysis of for example cultural issues (as explaining factors) could not be done. This further emphasizes the above mentioned need to further analyze the cases and the situation in the Netherlands before specific conclusions about copying systems from abroad can be made.

1.2.1 Focus of this study

The objective of this study is to inspire Dutch policy makers with foreign experiences (i.e. financial arrangements, governance structures) that enable discussion in the Netherlands about the future of the governance structure regarding water. For this reason the research team, client and guidance committee decided to investigate 5 items that are part of current professional debate in the Netherlands:

1. Public awareness of water issues and participation of the public;
2. Regional cooperation between responsible authorities;
3. Integration of water issues in spatial planning;
4. Private participation in water management;
5. Financing of water management.

These items are also identified in the Water vision of the Dutch cabinet, published summer 2007.
For the reason of making cases comparable this study, within the theme of surface water, focused (as mentioned earlier) on the policy theme of flood risk management. This could be done because the 5 items mentioned above all apply to this policy theme and seemed researchable within selected cases.

The aim of this study is to link the findings about the practice and organization of water institutions to the context in which water issues currently are taking place. Through the emphasis on the practical implementation of water management, the actual functioning of these activities can be analyzed, rather than produce an overview of the intentions of the activities. The study thus sets out 'best' and 'worst' practices abroad (within their own context) which can guide the discussion in the Netherlands and can provide with some useful inspiration.

Researched cases are:

1. Canton Zürich – several river basins in the Canton Zürich in Switzerland
2. Loire basin – the Loire basin in France, encompassing several "Régions" and "Départements"
3. England – several river basins in England;
4. Louisiana: the Mississippi basin in state of Louisiana, United States of America – focusing on the wider New Orleans area.

1.3 Report outline

The outline of this report is stated below:

- Chapter 2: Study design;
- Chapter 3: General research questions;
- Chapter 4: General results
- Chapter 5: Conclusions and recommendations
- Chapters 6, 7, 8 and 9: Case studies.

Results of an inventory of 8 countries are recorded in the appendices of this report.

2 STUDY DESIGN

The study has been implemented in three stages, where the research question has been refined in conceptual terms as well as in terms of selected cases. The study started with a description of main lines of water governance in 14 countries, and The Teisman Committee narrowed down in two selection steps to the organization of flood risk management in four cases.

2.1 Stage 1: broad description by country

This first phase started with an inventory of 14 countries. The outcome of this inventory was a broad overview per country on the situation on water governance in general and a description of the most important water issues related to the specific countries.

The European countries that were included are: Belgium, Denmark, France, Germany, Poland, Portugal, Sweden, Switzerland and the United-Kingdom.

Countries from other parts of the world that were examined in this stage are: Australia, New-Zealand, Singapore, South Africa and the United States.

Based on the factsheets, a first pass was given in formulating interesting learning questions. For the purpose of narrowing the scope of the study and to be able to formulate relevant research questions, a selection of 8 most interesting countries was made. These 8 countries were the object of study in Stage 2.

2.2 Stage 2: Focus on selection of countries

After the first Stage, the focus of study was on the 8 selected countries (Belgium, Denmark, France, Germany, Switzerland, United Kingdom, Australia and the United States).

These countries have been selected, because of the expectation that the relevant lessons can be learned from them. Again, in order to structure the information stream, a framework was developed. For each country, a case study was selected and specific research questions were formulated for each case. Also, the 5 items related to the main question were linked to the case studies. As mentioned earlier these items were:

1. Public awareness of water issues and participation of the public;
2. Regional cooperation between responsible authorities;
3. Integration of water issues in spatial planning;
4. Private participation in water management;
5. Financing of water management.

For each country again a factsheet was filled, in which the results of this second Stage were outlined. These factsheets are recorded in Appendix 2 of this report.

2.3 Stage 3: Case studies

Through an analysis of each case and a comparison on the outcome of the different cases, the focus of the study was further narrowed on the policy theme 'flood risk management'. In this respect a last selection of countries was made of which inspirations for the Netherlands are drawn.

The following countries and cases were selected:

1. Canton Zürich – several river basins in the Canton Zürich in Switzerland
2. Loire basin – the Loire basin in France, encompassing several "Régions" and "Départements"
3. England – several river basins in England;
4. Louisiana: the Mississippi basin in state of Louisiana, United States of America – focusing on the wider New Orleans area.

3 GENERAL RESEARCH QUESTIONS

3.1 Policy problems regarding water

There are many theories about governance of common pool resources. One central issue is overcoming the tragedy of the commons: common pool resources belong to everybody, and therefore nobody feels responsible to protect them against depletion. What might be depleted is the capacity of the physical system to carry valuable biodiversity, the safety of residential areas against floods, the potential of the physical system to produce drinking water, etc.

There are several interesting situations in the Netherlands. Firstly it is foreseen that climate change will require adaptation to the way our cities develop in order to prevent major flood risk (in terms of damage and casualties). City developers and planners compete for other things than prevention of the effects of climate change, and being the first to innovate city design gives a relative disadvantage on the short term.
Secondly, by developing behind dikes, potential damage of a flood increases. Dikes and safe area are expensive, and are we able to agree on a system to build dikes that are safe enough, and are we willing to all contribute to financing that? Are we willing to accept (some) free rider behavior?
Thirdly, surface water hasn't been as clean as it is today for a long while. However making it substantially cleaner would be necessary from ecological points of view, however this is relatively expensive and many actors must be involved in its implementation. The easy measures have already been taken. Should we give water managers the duty and power to regulate emissions? How should that be financed?

3.2 Research items and questions

As stated earlier research items were selected based on current Dutch professional debate about water governance.

Item 1: Public awareness of water issues and participation of the public
Water management costs money and sometimes has painful spatial implications. It may be assumed that in normal western societies water management therefore needs wide support. As it is a common pool resource, the general public should support the implementation of measures and be willing to accept the financial and spatial consequences. Spatial consequences may also be measured in financial terms.

The first research question was therefore: what is the role of public awareness and public participation in the development of water management?

Item 2: Regional cooperation between responsible authorities
As water is a common pool resource, some degree of collective is required. The level of collective action theoretically should follow the boundaries of the “pool” – for example, a river basin or a city. For simplicity, such an area may be referred to as a region.
The affected community in a region, and certainly the authorities having influence on spatial development, normally is not organized according to pool boundaries. Usually there will be a level of government that sets out the general institutional framework for water and spatial management, and in “pools” the authorities have to work together in order to define tradeoffs and implement measures, and define principles like the polluter pays principle or the profit principle (those who profit from a measure should also finance it). However, in different pools, there will be different institutional contexts as well as a different ways of cooperation with physical and institutional context.

The second research question was therefore: how is the water governance organized at regional level, and how is that affected by the physical and institutional context?

Item 3: Integration of water issues in spatial planning
In some regions, water management is more difficult or expensive than in other areas. Wetlands with biodiversity values are often very sensitive to pollution and draining. There may be competition with drinking water resources. Some areas are more difficult to protect from flooding than others. Building hard surfaces and structures may reduce or accelerate runoff and cause problems upstream or downstream. In short, there is often a water tradeoff in spatial development choices. In Western countries, it is widely believed that such choices should be public choices, and these should be made in view of their wider implications for water management.

The third research question was therefore how does a region make spatial choices, and take water into consideration?

Item 4: Private participation in water management (in particular insurance companies)
Once a strategy is determined for water management, its implication may be a public and or a private matter. It is sometimes believed that private actors are better able to do that efficiently, whilst public actors have more eye for non-economic values like social justice or long-term safety. This is in particular believed where risk is concerned.

The fourth research question was therefore: how do institutional systems make use of strengths of both the public and the private world, in relation to risk?

Item 5: Financing of water management (e.g. financial independence of water authorities)
As water management is costly, its budget is likely to be subject to debate. This budget is used for building flood protection structures, or buying land that is needed for water management. If there is a shortage of budget, the situation may become more unsafe than desirable if the risk were fully known. Financial arrangements where several financial sources should be joined may stimulate cooperation, but is may also make it more difficult. On the other hand, if water managers are given their own source of income that does not have to compete with other options of expenditure, they may be believed to pay less attention to the tradeoff between cost and benefit of water management.

The fifth research question was therefore: what kind of a system of financing water management is in place and what are the effects on the available budget?

3.3 Case outline (theoretical framework)

Flood risk management is defined as the way policy makers and water managers within a water basin deal with flood risk (likelihood times expected impact of a flood (e.g. Dicke & Meijerink, 2008). We distinguish the following theoretical strategies (based on Oosterberg, 2006):

1. **Flood protection (preventing floods)**: reducing the likelihood of a flood by preventing water to reach a sensitive (urban) area (or prevent sensitive areas to emerge in the first place);
2. **Prevention**: making a sensitive area robust and resilient to floods;
3. **Reducing vulnerability and resilience**: preparing an adequate response to floods;
4. **Crisis management**: ensure in case of flooding areas will be evacuated;
5. **After care**: repair and share damage cost,

In order to follow such strategies, there needs to be a governance system in place where powers and responsibilities are distributed, enabling implementation of strategies by government and market.

This governance system is "activated" at different levels:

1. Decisions about the content of flood risk strategies;
2. Decisions about the roles and responsibilities with respect to the development and implementation of FRM;
3. Capacity to do reflections upon the system of flood risk management.

These three levels of governance are closely related since they co-evolve with each other in every water basin, and it is expected that a description of these levels may inspire other water basins (however, especially the third level is difficult to assess.)

Level 1: Decisions about the content of flood risk strategies
Deciding about investments and spatial restrictions that influence flood risk and about emergency plans. If such decisions are transparent and widely shared in the governance system different actors are supposedly enabled to take flood risk and opportunities into consideration. Level 1 is primarily about the relationship between governments and citizens.

Level 2: Decisions about roles and responsibilities
This level analyses decisions about the "system" of flood risk management that drives level 1. This includes transparency about roles and responsibilities (including financing of strategies). Deciding about who should carry which risk and how risks are shared, and what this implies for strategies. Sharing risks may include financial transfers; for example between urban areas and upstream retention areas (strategy 1), or for making buildings more robust (strategy 2), or damage insurance on the basis of some level of solidarity (strategy 5). Level 2 is primarily about how the responsibilities identified at level 1 are distributed over between government and citizen, and within the government (and perhaps partly privatized).

Clear roles and responsibilities lead to risk and reward for the actors in the governance system. They may be put down in legislation and contracts, or simply be a grown habit. For simplicity, we assume that in any flood management governance system there are a few central actors with key responsibilities for flood management. For example, a local water management board that is supposed to build flood defenses. Or, municipalities that are supposed to take such measures (or ask their citizens to either take risk or take measures). This is where the dilemmas of flood risk management are felt as investment in the future that delivers no direct incomes but only avoids uncertain costs.

For each case study we propose to define a limited number, just one or two such central actors (agents), which however have to meet the desires of a larger number of principals: those who have essential powers needed to enable agents to implement the flood risk strategy. The use of such powers can give incentives to the agents. Here, we again focus on the most crucial incentives. What these are depends on geographical conditions as well on the set of chosen strategies (which interrelate).

We conceptualized the following crucial powers:
1. Requiring payment from citizens and corporations with the aim to finance flood risk management strategies
2. Prohibiting building or requiring strategies like protection or relocation in certain areas
3. Making decisions about funding of operational strategies

4. Requiring transparency of risk at crucial moments of development (aimed at awareness about risk and strategies)

There may be others; for each of these powers it is important to identify who has the power (which agent or which principal), and to which kind of interplay this leads. For example, are decisions about available funding made at local level (close to implementation) or at national level. Crucial actors in the flow of money should be identified.

Level 3: Capacity to do reflections upon the system of flood risk management

What is the capacity of the governance system of flood risk management in a water basin as a whole to reflect on its system of flood risk management? Explanations of this capacity may inspire as leading principles for developing water governance systems.

As is well known in the social sciences, complex governance systems don't make conscious decisions: decisions "emerge" through a process of co-evolution between components of the system, and between the governance system and the geographic system. Some governance systems are better able than others to produce collective decisions. This is closely related to its formal structure and its "social capital". Formal structure may, for example, prevent all actors in the governance system to feel responsibility to initiate a debate about the flood risk management system, or such a debate may be obscured by other issues which may seem more urgent. For example, a water basin may have a highly fragmented structure of government which is involved in conflicts which may not be related to water, however which at the same time may prevent informal cooperation at water basin level to emerge and inspire decisions about the flood management. Therefore we introduced above described third level to analyze the governance systems.

4 GENERAL RESULTS

4.1 Public awareness of water issues and participation of the public

4.1.1 Canton Zürich

Public awareness of water issues in the Canton is relatively high although major flood events are already more than 30 years ago. This might be explained by a general awareness of the possible risks of living in a mountainous area. On the other hand the Canton and the Cantonal insurance company are actively raising awareness using flood risk mapping (accessible through internet) and proactively contacting owners of properties in more dangerous areas. Also municipalities are taking responsibility to inform inhabitants about risks of flooding. Activities to increase awareness are to be seen as integrated part of the governance system in place.

Driver for transparency about flood risks is the mixed system of public (obligatory) and private insurance of properties against damage which is combined with building requirements and spatial planning.

Most striking is the utter tailor made flood protection measures the Canton takes (integrating ecological measures) literally every property has its own specific measures fitting the owners' requirements.

4.1.2 Loire

The "Plan Loire" website is the main public source of information about flood risk management in the Loire basin. Despite a major flood in the mid 19th century and smaller more recent floods, flood management at basin level seems to be primarily an affair of the state. There is some public awareness though, since experts believe that the regional councils are willing to finance flood protection measures with a view to electoral effects. On the other hand, there seems to be little public participation in the development and the implementation of actions of the Plan Loire itself; for example municipalities have not been involved. The Départements have the task to develop flood risk assessments, which should be annexed to municipal spatial plans. As far as known this does often not lead to public debates and therefore seems not to create awareness.

Tours and Orleans are cities where risk in terms of likelihood of a flood times expected damage may be larger than in The Netherlands. Experts indicate that development of these cities is insufficiently taking views of the public about such risks into consideration. The authorities could take more initiative to involve the public and ask it to make up their minds about risks. National regulations like flood risk zoning and compulsory risk assessments during property transactions have not yet been thoroughly evaluated, but experts have the impression that effectiveness in terms of raising awareness is limited. They imply that the municipalities (who are made responsible by the state for risk status reports used at a transaction) are not inclined to do anything that affects property prices negatively. This effect is strengthened by the fact that municipalities are not able to financially compensate damage of landowners (decreasing of property value) and most mayors don't want to loose their electorate. As state does not want to help the municipalities financially this situation is likely to be continuous. Thus little effect of this measure can be expected.

4.1.3 England

Public awareness of flood risk has significantly increased in recent times. The 2007 floods were headlined in the local and national media for more than a week and the interest continues as floods continue to happen.

The Environmental Agency offers several possibilities for the public to become aware of flood issues in their own area, such as a website where one can view whether his property is at risk of flooding, a free telephone service to warn for flooding and leaflets how to react to floods. Providing information on flood risk is now obligatory in real estate transactions.

The driver for the above openness on flood risk is insurance. British citizens will not be compensated by government if their property floods; the government does not have a statutory obligation to protect against flooding. Instead, a private insurance system is in place that provides cover against flooding events. This insurance is not obligatory.

Not everybody has insurance coverage (on average 78% of households but in some flooded areas this figure is 25%) or uses the information services of the Environmental Agency (for example 6% in the flood risk areas of Doncaster). The case of England shows that awareness on flood risk apparently does not always lead to taking action, or perhaps awareness is still too low in some cases.

4.1.4 Louisiana

Awareness of flood risk is high in the New Orleans area, also before Katrina the risks were widely known. Between 1978 and 2000 New Orleans was exposed to one damaging flood event per two year. The people of New Orleans seems to prefer high risk rather than jointly finance flood defenses or reduce development in places that are difficult to protect. The discussions appear dominated by the question who should pay which share of measures. There is some criticism that residential areas with poor people are protected less than those where rich people live. Insurance and associated small scale preventive measures are relatively more costly for poor people. Some richer people are said to build their houses at risky places and believe they will be bailed out if there is a storm. In other words, solidarity seems to be low despite high awareness. Randy Newman even made a song called “Louisiana” about a flood in 1927.

4.2 Regional cooperation between responsible authorities

4.2.1 Canton Zürich

The Cantonal level is responsible for building flood defences and provides a Cantonal damage insurance. Flood risk maps are made by the Canton and municipalities are responsible for enforcing the spatial consequences of it. The system uses 3 categories of risks: 1. no risk: building is not restricted. 2. slight risk: some extra building requirements are in place (to be taken by the owner) and 3. large risk: new building activities are prohibited.

When new flood defences are build by the Canton, this level of government cooperates with the municipalities and with individual owners of properties. Some rules, for example the prohibition of building in a riverbed unless upstream compensation measures are taken, do structure the way regional developments are set. In general can be said the Canton has some powerful instruments (i.e. flood risk mapping with legalized spatial consequences) however strong interdependency with municipalities and

even local property owners is the case. The Canton seems to cooperate with these lower levels fairly well. At least is satisfied itself with the results of the cooperation.

4.2.2 Loire

The Plan Loire is the result of cooperation between the national state, its subsidiaries at regional and department level, and elected bodies at regional and department level. By law such cooperation creates a legal form (the so-called EPTB; see their association site http://www.eptb.asso.fr) which is eligible for state subsidies for flood defense. The Agences de l'Eau (water agencies of which there are 6 in France) active in the Loire area, whose main interest is water quality, are not at the heart of this process. French experts see the EPTB for the Loire as a relatively successful cooperation. However, the link with spatial development is still weak; the Plan Loire focuses on building dikes.

4.2.3 England

In the UK many actors play a role in flood risk management. At national level, a key actor is the Environmental Agency, which has several regional offices. The most important actor at local level is the local authority, which is responsible for spatial planning. Other actors are the Water Services Regulation Authority (OFWAT), private water companies, British Waterways, Internal Drainage Boards and landowners.

Regional Flood Defence Committees exist which have a role in the promotion of flood defence schemes. Decision making on whether or not schemes are granted financing takes place at national level as there is a national priority system, although at regional level additional funding may be sought through local levies.

A major concern is the fragmentation of responsibilities concerning surface water management, especially considering pluvial flooding. During the recent floods, it turned out that due to the large amount of actors that have responsibilities, in some cases nobody felt responsible at all. Clarifying the rather complex management structure of especially surface water management is a major concern of the ongoing reform. One can see that responsibilities of major actors such as the EA and local authorities are strengthened; it is yet unclear how other actors (e.g. Highway Authorities, Water Companies, Internal Drainage Boards) will fit in this picture. It seems that drastic changes on this field are not to be expected.

4.2.4 Louisiana

Generally, interstate rivers are managed by the federal government (primarily the Army Corps of Engineers), but wetlands and floodplains are managed by several layers of government. Like many states, also Louisiana also has flood districts. New Orleans belongs to the Southeast Louisiana Flood Protection Authority. Experts indicate that its financial resources and its spatial powers are limited.

Responsibilities are fragmented, largely because financing of measures is fragmented. Prime responsibility is at the individual level of citizens and property owners. Coordination and liaison roles for floodplain management fall naturally upon Louisiana level agencies. Past analyses in the United States have illustrated that governments, organizations, and individuals often work to utilize whatever measures are necessary and feasible in a given situation to reduce flood losses or preserve resources, whether or not it is regarded as their "proper" role or responsibility.

The federal Water Resources Development Act (WRDA) stimulates cooperation through cost-sharing arrangements between federal and local agencies. The idea is probably that projects are undertaken with

cost-efficiency in mind. As a result, however, local politicians and regional members of Congress became more involved in project planning, coordination, and construction. According to experts this has led to the opposite: a decrease in vertical project linkages and an increase in site-specific construction, ad hoc protecting local properties.

Coordination might be in the form of collaborative ventures by diverse stakeholders, or possibly through bureaucratic management by a federal agency like the Army Corps of Engineers (Corps). Indeed, many within the Corps recognize the potential benefits from a more hands-on coordination role, but complain that current federal regulations tie their hands by focusing projects entirely on the needs of specific localities. This structure has evolved over the past several decades to focus Corps projects on local desires in an attempt to make the federal government more responsive to the needs of individual communities. Though this approach has succeeded in reducing Corps expenditures on specific projects and has probably made the Corps more responsive to local needs, it has created a patchwork of localized projects uninhibited by coordination at regional level.

After Katrina, new collaborative initiatives emerged in Louisiana and around New Orleans (for example, Louisiana's Comprehensive Master Plan for a Sustainable Coast). The financing of such plans remains uncertain however.

4.3 Integration of water issues in spatial planning

4.3.1 Canton Zürich

Above described combined system of damage insurance, building requirements and spatial planning (including rules about building in riverbeds) does lead to a certain degree of integration of water issues in spatial planning. The Cantonal philosophy is to first adapt the environment of a river basin and only when necessary to adapt the river bed. As a result there are no new buildings in dangerous area's and in less sensitive area's robust building is enforced. The Canton itself, which is responsible for flood management in the end is fairly satisfied with the spatial restrictions and the way they are enforced. However maybe economic pressure which makes the use of dangerous areas attractive is smaller in Zürich then in other cases. The spatial planning system in Canton Zürch can be considered very effective.

4.3.2 Loire

The link between spatial plans and risk assessments is compulsory in France. Risk assessments are made by the state (Départements). However, experts indicate that their effect is limited. They indicate that a large en deeply felt distrust between state and municipalities is causing this. Moreover it is easier to ignore risk, since municipalities would either have to compensate land owners for a devaluation of their properties if they change their allowable functions, or they run an electoral risk. Municipalities virtually can not take any measure to create spatial solutions, because they are facing many and sometimes powerful landowners. Indeed some local authorities are tempted to give building permits in risk areas, anticipating that local victims of damages would be compensated by the insurance superfund

Where cities build in the river bed, they compensate effects on river flow. Some Départements have a special team for technical support to Mayors. Handbooks of how to develop new urban areas without increasing runoff are under preparation by the spatial development experts of the Départements. However, the relationship between the state (usually represented by the Départements) and the municipalities (with the Mayors as central elected actor) is often rather tense. The state is seen as rich and law enforcing, the municipalities are often small and poor, and have their spatial planning competencies. This leads often to

distrust. Recently, new arrangements have been introduced so that municipalities may work together financially, which opens up new spatial development options without adversely affecting the income of small municipality. It is to be noted that this small scale also prevents municipalities of having sufficient knowledge of watermanagement. And commercial developers also seem to lack this type of knowledge.

4.3.3 England

The local authority is responsible for spatial planning. Flood risk is taken into account by the planning authorities in their development plans and the planning process. Although EA is consulted prior to development, this advice is not binding and sometimes not followed. Last year 13 developments took place against the EA's advice. Some 33% of the current urban development takes place in floodplains.

A policy document on development and flood Risk (PPS25) deals with all new or redevelopments. It outlines the methodology to be used for flood risk assessments, which are undertaken by a developer as part of any planning application. These consider in detail all the flood risks to/from a site and the surrounding area. PPS25 includes an "Exception Test" whereby development in the floodplain can be permitted, if the wider sustainability benefits to the community outweigh the flood risk.

Through PPS25 and the EA advice on developments flood risk has to be taken into account by local authorities and developers have to provide flood mitigation measures for new developments. This system seems to work well. Still, the presence of flood risk does not imply that no development takes place in an area - in fact one third of all developments take place in floodplains, in a few cases even against EA advice. It is interesting to note that the EA requires new developments to be protected to the 100 year level plus 20% for climate change. Should such sites flood in the future, the owners have no comeback on the planning authority of the developer.

4.3.4 Louisiana

According to the Association of State Floodplain Managers, regulating development can best be done by local governments, following the standards and procedures of state enabling authority. However, the state of Louisiana has little such regulations (see figure). Academics describe how the New Orleans parishes failed to act on their own initiative. Urbanization continued at sensitive locations.

To guard the federal government against the constant constituent pressures to bailout property owners and to reduce development in flood prone areas, Congress passed the National Flood Insurance Program (NFIP) in 1968. The NFIP is managed by the federal government. It was thought that a method to reduce construction in floodplains was to raise the costs of construction in these zones and to require the purchase of insurance premiums. Where effective protection through levees was possible, this could be subsidized. These federal rules seem to have encouraged intensified use of areas exposed to natural hazards, significantly increasing risk. American experts believe that the frequent bailouts and subsidized insurance create a "moral hazard" – inaction because people prefer to rely on compensation and bailout. On the other hand, damage is only partially compensated and many are not insured at all.

STATE REQUIREMENTS FOR LOCAL GOVERNMENT BUILDING CODE ENFORCEMENT AND COMPREHENSIVE PLANS IN ATLANTIC, GULF, AND PACIFIC STATES

State Requirements for Local Government Building Code Enforcement and Comprehensive Plans	States (Number of Coastal Counties/Parishes)
No state local government building code enforcement or comprehensive plan requirements	6 states with 58 counties: Alabama (2), Louisiana (25), Mississippi (3), New Hampshire (2), Pennsylvania (3), Texas (23)
State local government building code enforcement requirement but not comprehensive plan requirement	3 states with 37 counties: Connecticut (4), New Jersey (17), New York (16)
State local government comprehensive plan requirement but not building code requirement	5 states with 33 counties: Delaware (3), Georgia (6), Hawaii (5), Maine (10), South Carolina (9)
Both state local government building code and comprehensive plan requirements	10 states with 236 counties: Alaska (19), California (22), Florida (67), Maryland (17), Massachusetts (9) (plan requirement for larger cities and towns), North Carolina (20), Oregon (13), Rhode Island (5), Virginia (46),[b] Washington (17) (plan requirement for high growth counties only)

SOURCE: Schwab (2002).
a. Local governments in seven of these ten states (California, Florida, Maine, Maryland, North Carolina, Oregon, South Carolina) are also required to include a hazards element in the comprehensive plan.
b. Includes independent cities as well as counties.

Figure 1: regulating local governments (or not) in the United States (Burby, 2006)

4.4 Private participation in water management

4.4.1 Canton Zürich

The Cantonal damage insurance (which is a public service) has some interesting incentives for increasing private investments in water management. In the slightly dangerous areas (where building is possible under conditions of robust building) all existing properties are contacted by the insurance company who advises to take extra preventive measures to make the building robust. (Of course new buildings are to meet the robust building standards straight a way.) The Cantonal insurance company offers to pay 30% of the costs of these measures; however if advised measures are not taken, exclusion of the public insurance will follow. The owner then can still rely on a private insurance (which is more costly however).

4.4.2 Loire

In the System Catastrophes Naturelles (CatNat), introduced after major floods in the 1970s, every property owner is insured against flood damage. It is based on a solidarity super fund, which is filled with a levy on car use and on normal housing insurances in general (not specific or modulated for areas with flood hazard). The implementation of this insurance system has been left to private insurance companies, who demanded that the state would warrant enough funding if a major catastrophe happens that exceeds the available reserve. The state has increased the levy on car use and house insurances from 3% to later 6%, 9% and in 2006 to 12%. There is no link between the insurance premiums and the flood risk.

Insurance companies, responsible for managing the Fonds Barnier, have little incentive to be concerned about flood protection, since there is hardly any credible link between flood prevention and the benefits in terms of prevented damage. They do not pose any rules to those who are insured and claim damage.

4.4.3 England

Due to the absence of a statutory obligation of the government to provide flood protection, this is left to the private market. Insurance companies in the UK provide cover for flooding events within a general household coverage. The cost of the package in principle reflects actual flood risk in the area where one lives. The Association of British Insurers (ABI) has issued a Statement of Principles in 2005 outlining that the insurance companies will provide flood insurance cover to everybody at, provided that government takes sufficient action to reduce flood risk. This is a non-formal agreement between ABI and the government.

The ABI statement of principles on flood insurance is an example of an unofficial agreement between a private pressure group and the government. Until now, this agreement has shown that insurance companies are willing to provide flood insurance cover. However, the large amount of uninsured households is troubling. Although there are activities to increase public awareness about the need for proper flood insurance, the absence of a (governmental) safety net is striking.

4.4.4 Louisiana

The NFIP is managed by the federal government, since most commercial insurance companies refused to cover flood damage in standard property insurance policies. To be insured against flood damage, individuals also must work together in local communities to implement plans for floodplain development and flood reduction (primarily buildings should be raised to above the 100-year flood level, or at times the clearing of a floodplain to prevent development). Often this works in conjunction with the construction of flood works such as levees. However, individual property owners often decline to enroll. Collective private action therefore often fails, and public action in many cases, certainly in New Orleans, does not fill this gap.

4.5 Financing of water management

4.5.1 Canton Zürich

The Cantonal level is responsible for flood defences and pays measures from the general budget which is based on the Cantonal budget. The Cantonal insurance is funded by premiums however Some Cantons (including Zürich) have created a upper Cantonal budget which can relieve a Cantonal insurance company in case of a catastrophe.

4.5.2 Loire

The finance of the Plan Loire is the result of a negotiation between all participating governments. Municipalities do not participate in financing, but they are represented in defining the actions.

Part of the damage covering budget of the CatNat system is used to finance flood hazard reduction plans for private actors, supporting measures to make houses more robust (the Fonds Barnier). All other finance

of dikes stems from general government budgets, by far most at the level of the national state, supplemented by finance from the Regional and Departmental Councils.

An interesting form of co-financing flood management is the so called PAPI. The PAPI is not applicable to the Loire basin. It creates a financial incentive to make Mayors more susceptible to a conscious flood risk strategy. It is a promise of co-financing on the condition of cooperation at basin level. The ministry of ecology, when lanched a successful open tender in 2003. At present, 50 PAPI have been awarded, with a total budget of 1,5 billion euro. Of this budget, 400 million is provided by the Fond Barnier. The State funds are not related to spatial measures, but only to public works.

Some French cities pay compensation for land owners upstream who keep their land available for temporary flooding to prevent flooding in downstream cities.

4.5.3 England

Defra funds the Environment Agency through a system of block grants (currently GBP 600 million/year). Regional Flood Defence Committees contribute some GBP 25 million annually through local levies. In case of new developments, the developer is responsible for flood mitigation measures. In some cases, Regional Development Agencies fund flood defences as part of regeneration projects.

Funding for flood risk management schemes by EA largely takes place through a national prioritisation programme, supplemented by local levies raised by Regional Flood Defence Committees. Defra funding levels are set by the government and flood defence has to ‘compete’ with other issues. Currently flood risk is high on the political agenda and funding is increasing over the coming years, but the system seems not as robust as in the Netherlands.

4.5.4 Louisiana

Individual property owners often build personal levees (particularly in agricultural areas) and some river-towns have community-built levees. Most projects are joint local-federal projects; the resources and engineering expertise of the Army Corps is probably more than any individual community has. Levee boards or Parishes could collect taxes in order to match co-financing from the federal government. Louisiana State has little budget from itself; even state agencies administrative cost is mostly subsidized by the federal government. Between 1995-2004, Louisiana received $40 M from the federal government for hazard mitigation. After Katrina, this was increased considerably.

After Katrina, Congress Coastal Impact Assistance Program (CIAP) was approved, amounting $523 million through 2010 for coastal restoration and infrastructure projects that address the effects of offshore oil and gas activities in Louisiana’s coastal parishes. Congress approved in 2006 an offshore revenue agreement that gives Louisiana approximately $20 million per year until 2016. After that date, Louisiana will receive between $300 and $500 million or more per year. This funding level recognizes that Louisiana supplies one-third of the nation’s oil and gas. To ensure that this money is properly allocated, Louisiana voters overwhelmingly approved a constitutional amendment in the fall of 2006 that will place all offshore revenue not already earmarked by Congress in a “lockbox” reserved exclusively for coastal restoration and protection.

However, there is a match requirement. For every federal contribution through the Water Resources Development Act or similar program, Louisiana must be prepared to supply a match of at least 25%. To meet the match requirement, Louisiana’s Comprehensive Master Plan for a Sustainable Coast 2007

indicated Louisiana will still need to dedicate hundreds of millions of dollars a year exclusively to coastal restoration. There seems to be a stalemate between federal and state level, since both feel the other should pay more. The rationale for paying mentioned in official communications is that economic value is at stake (e.g. the importance of New Orleans as American port, or the importance of the Louisiana coast for oil and gas). There is also debate about the social issue: should poor (often black) people be protected as a matter of solidarity?

Levee boards and local authorities are entitled to increase taxes for flood defense purposes. They receive considerable assistance from the federal government, under a matching requirement. However, these local authorities seem to be paralyzed; they seem to be more afraid of paying too much compared with the federal government, and seem to they fear raising taxes where mostly poor black people would benefit (since rich people live on other locations or expect bailouts). This failure is not a matter of power or competition between functional and general government: levee boards do have the power to raise taxes, and they do have the task to create safety. Introducing stricter solidarity-aimed safety norms in federal legislation, which would force levee boards to raise taxes in order to meet norms, is simply not fitting the American culture.

5 CONCLUSIONS AND INSPIRATION FOR THE NETHERLANDS

5.1 Public awareness of water issues and participation of the public

5.1.1 Conclusions

In all cases, except Zürich, government and/or experts feel that public awareness should be increased. Various approaches are used to make the public aware of risks (telephone warning system, obligatory transparency in real estate transactions and/or spatial planning, risk mapping available on the internet).

Experts argue that in cases where collective arrangements to limit risks are in place (e.g. flood insurance in the Loire basin) public awareness is perceived to be low. In cases with a more individual approach (e.g. England) social scientists expect public awareness to be higher and government expects individuals to take care of themselves. However, in England not everybody buys an insurance policy or subscribes to a telephone warning system in spite of significant efforts of government and the private sector to increase awareness. This also applies to Louisiana where rate of insured properties is even lower. Apparently, citizens have reasons not to take action. They are probably focussing on short term benefits. Thus, in practice larger awareness not always leads to action. In case of Louisiana this leads to alarming low levels of security for the community as a whole.

Still, social scientist widely believe that increasing awareness works best by creating individual incentives, so that an active choice is needed. Systems that to a large extent rely on such individual choices for keeping people safe are less robust in taking care of the safety of *all* citizens. Some choose not to protect themselves. There seems to be a tendency that risks are ignored despite present awareness, sometimes because there are no alternative options available or because of a focus to short term benefits (Louisiana, England). Collective governance systems seem to create more equally divided and higher levels of security (because collective measures – such as building levies – are more effective). These kind of systems need to be legitimized by the constituencies of the responsible authorities; in these cases more collective forms of of public awareness are needed.

Typical for the Netherlands is that available public budgets for flood risk management are quite high, among others due to the higher safety standards in place in the Netherlands. Although not specifically investigated in this study, it could be argued that due to high public awareness on the importance of water management in our country the management system evolved in a robust way. At collective level the awareness of water issues therefore can be regarded to be high.

5.1.2 Inspiration for the Netherlands

In some cases awareness is generated at an individual level, which leads to an increased individual ability to deal with risks. Relying solely on individual choice to limit risks will however lead to less robust systems and perverse (social) effects, due to the fact that some people tend to behave irresponsible trying to maximize short term benefits. Finding the ideal mix between collective and individual risk mitigation would be an interesting topic for further research.

Interesting methods come forward in the cases of how governments try to make the public more aware of flood risks. England (telephone subscription to a flood warning system, flood risk maps on internet accessible by postal code) and the US (evacuation route signs on the streets) are the clearest examples. Although similar methods are in use in the Netherlands, international examples can provide creative ideas

for increasing awareness, especially concerning the issue of controlling smaller floods which do not pose a serious safety issue, but lead to nuisance to inhabitants. Note that it is always to be kept in mind that increasing individual awareness is only sensible if there is an individual ability to deal with risks, doing otherwise will only create fear.

5.2 Regional cooperation between responsible authorities

5.2.1 Conclusions

Fragmentation of water responsibilities and powers is a general issue
In all case studies, there is no single government where responsibilities and powers related to flood management are concentrated, and consequently, cooperation emerges at basin level or sub-basin level. In the Loire basin, the law offers the possibility to establish an official platform (without the municipalities) that may receive financial assistance. In England responsibilities are highly fragmented at decentralized level, and these organizations have difficulty acting as one. In Louisiana cooperation initiatives are taken by several state and federal organizations on an ad hoc basis. In all cases fragmentation, including that of funding of defenses is seen as a key limiting factor to achieve effective flood risk management. Also, municipalities usually have little role in any cooperation, whilst their spatial planning powers (and in England also financial powers) often are key to effective basin flood management.

Cooperation between authorities to enforce rules for robust design
In Zurich, there is wide acceptance of rules for robust building in relation to zoning, and flood risk management is seen as effective. In other countries, there are also such rules, linked to flood risk insurances, but there these rules are regarded to be insufficient. Rules seem to be properly observed, but measures at individual buildings or other small scale measures (sufficient enough in Zurich) apparently do not offer satisfactory protection in the other countries. Perhaps this is due to the rigidity of these rules, or physical circumstances may lead to a necessity of larger scale measures. It has to be noted that these countries do not make a distinction between areas protected by flood defenses (as a Dutch dijkring) and areas that are not protected

Cooperation to cope with local city flooding is an emerging problem is not yet emerging
Especially in England, but also in the Loire basin, flooding from sewers or from local runoff is a major problem. Water accumulates in low areas, which can be prevented, but affordable solutions often are not applied. Municipalities have general problems with that. It is better in Zurich, where municipalities cannot use water authorities as scapegoat. This situation is very similar to the situation within a ‘dijkring’ in the Dutch context.

5.2.2 Inspiration for the Netherlands

Compulsory rules for robust building on locations with occasional floods are not such a strange idea, and in Zurich they are key to a successful flood management system. In the other countries the emphasis seems to be more on cooperating for larger scale measures at (sub)basin level. There, fragmentation creates difficulties, which seem to be much larger than in The Netherlands. However, in all cases municipalities have key powers and have difficulty to take flood risk into consideration whilst others are managing (sub)basins. It is quite common that water issues are not taken in account at all because other issues (like economical development) are prevailing. This is quite like the Dutch situation, and it seems that it is difficult for municipalities in many countries to work closely together with water authorities or cooperatives filling that role.

Zurich shows that municipalities have no fundamental problems with dealing with local flooding in close cooperation with the Cantons, and it may even be the case that this is thanks to the fact that there are no other authorities carrying any responsibility, and therefore cooperation between water experts and spatial planners becomes a quite simple affair between only two involved organizations (Canton and Municipality).

The waterschappen seem to be relatively effective as manager of flood risk at regional level, since their responsibility is clear and their finance is secure. The downside might be that general authorities (in particular municipalities) are less inclined to take water risk into consideration. However the cases show that investigated countries municipalities are also not inclined to take water issues in to account. A major plus is that Waterschappen are strongly legitimized to put water issues on the spatial agenda.

Breaking of dikes in regional water systems may be caused by urbanization without creating sufficient temporary water retention capacity, which would require consideration in local plans. However the waterschappen seem to cope with this situation by taking preventive measures. It is recommended to study if this responsibility can be made more explicit and if that would make a difference.

5.3 Integration of water issues in spatial planning

5.3.1 Conclusions

Risky spatial development continues almost everywhere
In Louisiana, Loire and England, building in floodplains continues despite available information that this has a high risk. Professionals indicate that consideration of costs and benefits should lead to less development in floodplains, in particular if social equity is taken into consideration. In the Loire basin and Zurich, building in river beds is forbidden unless the effects of flooding are compensated upstream, and this rule is enforced. In England climate change has lead to a planning rule to create a 20% higher protection level for new developments.

There are often formal systems of risk transparent spatial planning
The Loire, Zurich and England cases have formal spatial planning systems where the government must give permission to development after consideration of the flood risk implications of draft plans. In Louisiana, such a system is largely absent (which is not typical for the USA).

Effectiveness of flood risk assessment systems varies and often is unclear
Only in the Zurich case such information leads in all normal cases to abstaining from development where certain risk limits are exceeded. In the other countries, there may be some preventive effect, in the sense that development takes place on a less flood prone location or in a more robust way (especially in England), but in the Loire area and foremost in the Mississippi delta, the effect of available risk information on spatial development seems to be limited. In these cases, information is supplied by professionals independent from the municipality itself (USA: Army Corps – but not compulsory; Loire basin: Departements, England: Environment Agency, Zurich: Cantonal insurance company)

However, spatial planning always remains a responsibility of local authorities, which make their own tradeoffs, and effectiveness of transparent information is therefore difficult to evaluate (there are no objective quality criteria for political tradeoffs). It might well be the case that transparency is only effective where the responsible authorities have alternatives locations where a similar “business case” can be made for their own population.

Low protection sometimes "irrationally" attracts more development
Once dikes have been built, which may offer some level of flood protection, development behind the dike often accelerates despite remaining risk. This occurs in Louisiana, and probably also in England and Loire basin. The total risk then increases because potential damage and casualties increase, even despite the fact that much safer location seem to be available.

Planning culture has influence
There are indications that the practice of spatial planning varies a lot – sometimes plans are used to actively change the autonomous processes of spatial development, sometimes plans appear to accommodate development proposals without changing them (possibly taking flood risk into consideration). The influence of spatial plans on spatial development seems to be in declining order (and generalizing): Zurich, England, the Loire (Louisiana has no system of spatial planning linked to water risk assessment).

The relationship national state – local authority is determined by many factors
States try to influence the way municipalities deal with spatial development and flood risk, not only by creating compulsory transparency about flood risk. It is difficult to identify root causes of these difficulties. Factors like the operating scale of independent local authorities, the scale of flood problems which require a similar approach throughout a country, seem to play a role as much as the more general culture of governance: centralization leading to general distrust spilling over to flood risk management, and even the difference between a roman law basis (where absolute norms lead policy processes) and common law (where decisions about norms have to be made over and over again from the bottom up).

In France in general, cooperation is stimulated between municipalities, in order to give them shared finance and therefore less interest in limiting location alternatives to a small (and possibly risky) area). However, there is no tradition of active interference by the state into municipal affairs, and there is often distrust in the state's organizations that offer information about flood risk. In Louisiana, there is no tradition of interference at all, and the federal level has difficulty to make an exception for Louisiana as an exceptional situation in the USA. In England there are direct financial incentives to take flood risk into consideration in spatial planning, and there commercial estate developers are obliged to interact directly with state level (environment agency) about risk.

5.3.2 Inspiration for the Netherlands

In all cases, states and regional authorities struggle to stimulate local authorities to take flood risk into consideration by means of spatial planning. Where spatial development leads to more acceptable flood risk (in the eyes of professionals – since this remains a political choice), it is not clear whether this stems from a less difficult situation (more alternative locations; possibility to solve the problem through robust building only) or from more "rationality" in the governance process. The widely varying general context of spatial planning is more important than the "transparency system". Compulsory flood risk assessment in spatial planning (in combination with zoning), is widely seen as an invaluable component of flood risk management, but designing an effective system is difficult and context-dependent.

In the case of The Netherlands, similar elements as other countries have been built into the spatial planning system (water test, for river beds: the guideline rivers and IMAB). Regarding primary defenses, The Netherlands has a centralized spatial planning system, overruling local authorities, what other countries lack. The Dutch system probably leads to more safety, but on the other hand, communities loose the discretion of setting their own priorities. Regarding local flooding due to rain collapsing of smaller dikes, flooding of lakes and larger waters courses inside the primary defenses, the Dutch situation may be

comparable with other countries. Municipalities have full discretion, and they are informed about risk by independent water authorities (the waterschappen). A major difference is that these authorities are not under control of the national state, like in other countries. However, the problems appear to be similar. There seems to be no reason to believe it would work better if the task of waterschappen would be transferred to a higher government.

5.4 Private participation

5.4.1 Conclusions

In all cases damage insurances (of properties) are part of the financial arrangements and seem to be an important part of the arrangement. In England this is the only safety net (however not everybody is insured), in the US there is a bailout option which leads to perverse effects; also in France in general perverse effects are perceived due to the compulsory nature of the French insurance. Making citizens responsible for their own safety as is the case in England en Louisiana and using insurance as an instrument to make them more aware seems not to lead to higher governance capacity when compared to governance systems in which government takes responsibility to provide for a certain level of safety (as is the case in the Netherlands). The problem is that self organization is required but the governance capacity of forms of self organization found in this study are not enough to realize real safety (see for example conclusions about the integration of spatial planning and water).

However when a public (and compulsory) insurance is combined with incentives to take preventive measures at individual level and with a strict spatial planning procedure in place (as is the case in Switzerland) this seems to work well to increase awareness and realize a certain level of safety. Also making commercial developers responsible for robust building (in England) seems to have some positive effect.

5.4.2 Inspiration for the Netherlands

Damage insurance for pluvial events is also applicable in the Netherlands, however when a primary flood defense fails the state provides compensation of losses. This is understandable because state takes responsibility by using legally stated safety norms. This Dutch system seems to work well and governance capacity to deal with unsafe situations is far larger then is the case in England or Louisiana.

Interesting is to see that some pressure of insurance companies against the waterschappen and municipalities can be expected in the Netherlands if local prevention measures (for example against pluvial events) turn out to be insufficient (as is also the case in England, however concerning complete different proportions of the problem). The Swiss situation seems very interesting for the Netherlands, because of the linkage with building requirements and spatial planning. It would be worthwhile to further investigate this system.

5.5 Financing of water management

5.5.1 Conclusions

General budgeting

A functional water government responsible for flood risk management and levying its own taxes (as is the situation in the Netherlands) isn't in place in any of the cases except for rural parts of England. However the scale and impact of the drainage boards in England is incomparable with the Dutch waterschappen

which are larger and have more impact. In all cases Flood risk management projects are paid from the general budget. However differences between cases in terms of the financial arrangements and distribution of responsibilities are great. In England for example commercial developers are made responsible for sufficient safety measures when building new housing. Also the cooperation between different levels of government varies between cases. However in all cases the general budgeting leads to less stable budgets because financing flood protection measures is susceptible to political debate about priorities between different policy fields.

Co financing
Some countries use co financing arrangements between federal and state level or between state and local level. An important risk of these co financing arrangements is the occurrence of stalemates between the involved levels of government, which is the case in Louisiana. However in France (not specifically in the Loire basin) co financing seems to stimulate cooperation between different entities of government. In England the effect of co financing seems small, probably due to the relatively small budgets involved.

5.5.2 Inspiration for the Netherlands

General budgeting
When the Netherlands is compared with the cases the Dutch situation with an institutionalized functional governmental body for water management which can levy its own taxes and is responsible for maintenance of the flood defense works using safety norms that are legally laid down is unique. Political debate about maintenance budgets in relation to other political priorities is thus very rare in the Netherlands. In comparison with the cases safety budgets and safety levels are much higher in the Netherlands. And the Dutch context seems to value these levels of safety very much. A tragedy of the commons as is seen in the cases of Louisiana and England, which raises a social issue, is virtually inconceivable in the Netherlands. If we keep to value safety in the Netherlands as high as we do, the cases don't provide a best-practice for the Netherlands.

Co financing
Co financing is used also in the Netherlands. It is mainly used to stimulate cooperation between government entities and to provoke innovations. This is the case with so called 'synergy measures' between the 'Nationaal Bestuursakkoord Water' (local prevention and proaction measures regarding flood risks) and the Implementation of the EU Water Framework Directive (water quality), which are subsidized by central government. A possible lesson for the Netherlands is to watch out for perverse effects of co financing when applying this instrument to vital parts of the infrastructure. However when used to stimulate cooperation when this is needed for less vital elements of the policy it can work quite well.

6 CASE STUDY: CANTON ZÜRICH

6.1 Description of the context

6.1.1 Geography and flood risk

The surface of Switzerland is comparable with that of the Netherlands and includes 41,290 km^2 (land 39,770 km^2, water 1,520 km^2). The temperature, which varies with altitude, is cold with rainy/snowy winters and cool to warm, cloudy, humid summers with occasional showers. The terrain comprises mostly of mountains (Alps in south, Jura in northwest) with a central plateau of rolling hills, plains, and large lakes. The lowest point is lake Maggiore (195 m) and the highest point is Dufourspitze 4,634 m (Almost 100 peaks are close to or higher than 4,000 m).

The Alps can be considered as “the roof” of Europe. Many of the European rivers have their origin in the Swiss Alps. General speaking Switzerland has sufficient freshwater sources. As an average over the total area, the total precipitation rate corresponds to 1,456 mm[1] or 6,000 m^3 per capita.

Because of its geographic situation, Switzerland has certain specific topics which are important in the field of water management. Flood control is one of these topics. During the last 25 years, floods have generated damages evaluated at about € 125 million per year. Furthermore, the protection of groundwater quality is a main issue, because the origin of 83% of the drinking water is groundwater. Hydropower is also a main water issue; Switzerland has approximately 1200 hydropower plants.[2]

Switzerland, although not a member of the European Union, has committed itself to the Water Framework Directive (WFD), but it has not yet transposed the WFD into national legislation. Though, Switzerland already has a history of river basin management planning. Many of these basins require two or more cantons to work together. Traditionally management in river basins is connected with on the one hand hydropower, and on the other hand flood control and protection against inundation.[3]

Flood risk
The upper flow of many rivers in Swiss territory is characterized by unstable, torrential regime. Occurrence of devastating floods has promoted local communities over a few centuries to undertake considerable civil works in order to protect agricultural lands and settlements against floods, particularly in the upper valleys of major rivers such as the Alpine Rhine upstream.

6.1.2 Structure of the government

Since 1848 Switzerland has been a Confederation and is at the moment divided in 26 Cantons. Each Canton has its own constitution, a cantonal parliament and government as well as its own tribunal. The Cantons are subdivided in municipalities. About a fifth of the total Municipalities in the Swiss have its own Parliament. The remaining, apply direct democracy through the Communal Assembly.

[1] The main terms of the water balance of Switzerland over the period 1901-1980, after Schädler, 1985
[2] Anonynous (2003) Public Participation in River Basin Management in Switzerland, report part of the HarmoniCOP Project
[3] Anonynous (2003) Public Participation in River Basin Management in Switzerland, report part of the HarmoniCOP Project

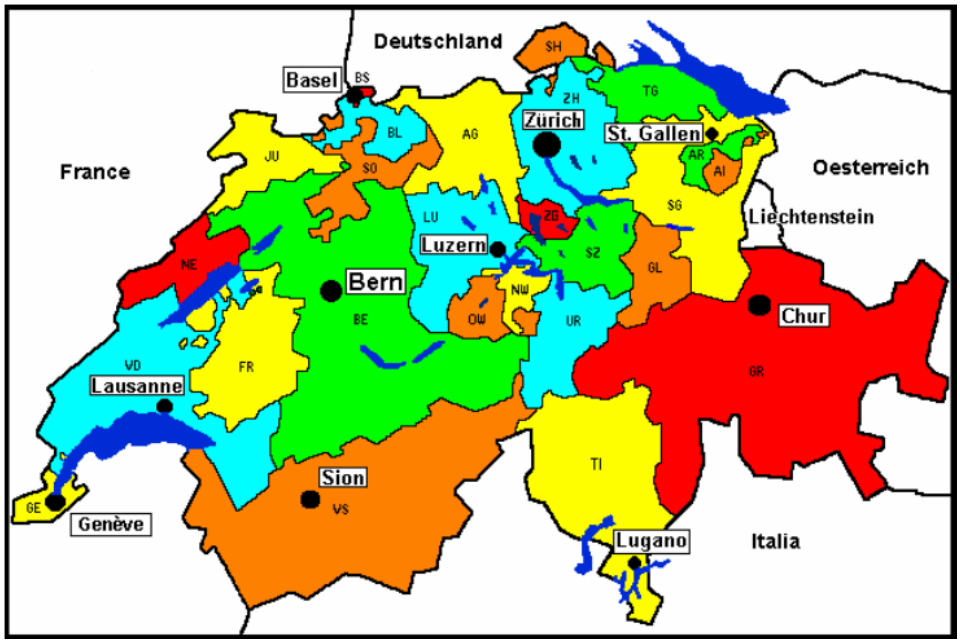


Figure 2: Political map of Switzerland

The federal level has limited competencies in the field of water management. The Federal Government – the Swiss Federal Office for Water and Geology – can enact acts and rules aimed at rational use and protection of water resources and protection against possible water damages (flood amongst others). A Canton can utilize a river which is under it sovereignty for its own uses, or it can assign its use to a third party (a hydropower company for instance) under a concession.

Although each of the 26 Cantons comprising the Swiss territory has full sovereignty on natural waters within its juridical territory, this has never been an obstacle for cantons to contribute full collaborative efforts, in areas extending over two of more Cantons, to undertaking long lasting River basin Management works to protect people and property against floods.[4]

The *Federal Office for Water and Geology* (FOWG) is the highest regulatory body, at Federal level, in all issues concerning: i) water use, ii) river basin management, iv) hydrology, v) flood protection, vi) geology and hydrogeology; vii) natural hazards and displacement of hearth masses, and viii) earthquakes.
Federal financial contributions to flood protection and river basin management project currently under implementation in Switzerland, are being provided through FOWG.

The *Swiss Agency for Environment, Forestry and Landscape* (SAEFL), which belongs to the Swiss Federal department of Environment, Transport, Energy and Communications, is the highest environmental regulatory body at Federal Government level. In addition to others, the SAEFL provide inputs to draw laws and decrees related to protection of natural waters and provides information and advice to the public.

Legislation

[4] Anonynous (2003) Public Participation in River Basin Management in Switzerland, report part of the HarmoniCOP Project

The Legislation concerning water use is structured, at federal level according to three main sectors of water sources management: i) water resources protection; ii) use of water and iii) protection against risks related to water.

Canton administrations have considerable autonomy in determining water acts according to their own needs, geographical constraints and political choice. So it can be said that water management is highly decentralized to the cantonal level[5]. The Confederation has however the right to intervene when conflicts related to right of water use would arise among neighboring Cantons.

Federal law on protection of waters (24 Jan. 1991)
With the revision of the law on protection of water of 1991, Swiss legislation has extended the terms of protection of water until the merely based on qualitative criteria, also to quantitative aspects, including for instance the obligation of the release of minimum amounts of water downstream of hydropower dams and taking account of agricultural lands.

According to Art. 19, the Cantons are to determine the territory into protection zones as function of potential risks to both surface and ground waters. The necessary prescriptions are formulated by the Confederation. Art 20-21 state that the Cantons have the responsibility to determine protection areas and immediate protection perimeters around intakes and the installation of artificial recharge of groundwater. Art 29-36 states the obligation for and provided basic guidelines on how to maintain minimum permanent residual water flows in watercourses. Art 37 sets limits and conditions in straightening and controlling watercourses by means of dykes.

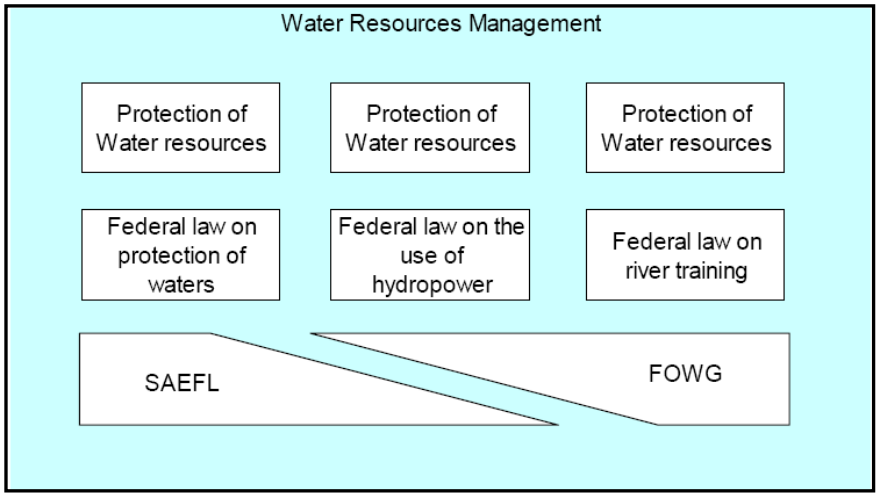


Figure 3: Regulatory and advisory competence domain of the SAEFL and FOWG in the elaboration of legal text according to the main sectors of water resources management (After Pfaunder, 2003)

The two most important water acts at national level are the Federal Act on Protection of Waters (*Bundesgesetz über den Schutz der Gewässer*) and the Federal Act on River Training (*Bundesgesetz über den Wasserbau*). The former has as its goal to protect water from 'detrimental effects' (article 1). The latter has as its goal to protect humans and 'things of considerable value' (*erheblichen Sachwerten*) from the

[5] ibid.

harmful effect of water, in particular floodings but also erosion and sedimentation. This goal is given the term *Hochwasserschutz* (article 1). Also, there is a Federal Act on the use of Hydropower[6]

Planning
The Act on Protection of Waters contains some planning provisions. The Cantons are supposed to designate three areas in which different provisions apply in relation to the protection of water.
These three areas are:

- *Gewässerschutzbereiche*: cantons are to determine the territory into protection zones as function of potential risks to both surface and ground waters. The necessary prescriptions are formulated by the Confederation. In zones with a high risk, a license is needed for certain building and construction works.
- *Grundwasserschutzzonen*: cantons have the responsibility to determine protection areas for ground water which are in the public interest and to determine what the division of property rights in these areas is. Provisions are in place for land owners in these areas.
- *Grundwassserschutzareale*: cantons determine immediate protection perimeters around intakes and the installation of artificial recharge of groundwater.

Also, the act contains a provision which states that the cantons should see to it, that on a local level and, if necessary, on a regional level drainage plans (*Entwässerungs-planung*) are drawn up.[7]

Furthermore, the available Swiss water acts do not seem to contain planning systems of any kind. Land use planning is, like the management of water resources, a competence of the Cantons. There is however a Federal Act on Land Use Planning (*Bundesgesetz über die Raumplanung*), which lays down the framework within which the federal level, the Cantonal level and the municipal level (level of the *Gemeinde*) should engage in land use planning. It isn't clear however, how water management fits into this. More specifically, in the case of flood control, there are relations between water management and spatial planning.

6.2 Description of the Flood risk management system

The Swiss strategy towards floods can be translated towards the following measures:

1. reducing damages
2. maintenance of rivers and protection structures to keep present safety level
3. spatial planning measures to avoid an increase of damage potential
    a. keep free high endangered areas (red)
    b. adapted construction and local protection (permanent or mobile) in medium and low endangered areas (blue and yellow areas)
    c. restricted land use in areas necessary for retention and emergency measures
4. emergency planning, being prepared for worst case
5. insurance, to enable reconstruction after damages occur

[6] ibid.
[7] Article 7, Law on the protection of water

6.2.1 Pro-action

After the heavy rains and storms of 1987 the risks for the living conditions was reviewed. This resulted in the *Bundesgesetz über den Wasserbau* (WBG) which was implemented by the first of January 1993. It has the intention to protect humans and 'things of considerable value' (*erheblichen Sachwerten*) from the harmful effect of water, in particular flooding but also erosion and sedimentation. This intention should be realized with as little as possible interventions to the river basin.

Measures are taken based on danger analyses on differentiation of the protection goals, the functional planning of measures and the limitation of the remaining risks. The whole process is based on pro-action[8].

Danger analysis
The danger analysis is based on recognition of the danger situation which results in a choice and determination of the protection measures. Important basis for this are the danger land registers and the danger maps which have to be incorporated in regional and local development plans. Within a hazard zone the growth of vulnerability can be limited or even prevented by considering a few planning principles: (1) avoid hazard zones (prohibition of construction), (2) establish appropriate building codes, (3) reinforce existing structures (local protection), (4) issue codes for a particular agricultural use. The recognized hazards should not be punctually removed but imbedded in a global concept for the entire area. Only if the measures 'maintenance of rivers' and land-use planning are not sufficient, structural (technical) measures should be implemented, such as the building of dams, dikes, structures which hold glacial detritus and alterations of water flows.[9]

Another point of horizontal coordination is the fact that according to the Act on the Protection of Waters, a building permit can only be issued if the construction is near enough to the sewer system. There are some exceptions to this rule possible.[10]

Differentiation of the protection goals
The determination of the protection goals and with that the determination of the water level to be protected brings technical solutions forward which have financial implications. The choice of the protection goals is now based on the value and is split up by categories like residential area, infrastructure and agriculture. The philosophy of flooding once every 100 years used in the past is not longer applicable. By high value it is advised to bring the level of protection up and of agricultural use for example the value should be limited.

In the `80s a mind shift occurred as it was no longer believed that the state should be able to offer 100% protection.

Flooding hazard maps
According to the federal act cantons are responsible for compiling flooding hazard maps. For the Canton of Zurich this was started from 2000 onwards. Together with the Gebaudeversicherung Kanton Zurich (GVZ) and the Baudirektion (building management) guidelines for the utilization of the flooding hazard maps where published in the autumn of 2003. These guidelines give information as how the hazard maps should be implemented through the means of regional planning and building regulations. In this the Baudirektion has the responsibility to determine the flooding hazard maps while the municipalities are responsible

[8] Pro-action is defined as measures to prevent water to flow to sensitive places. This can be either done upstream (limiting the speed of runoff) or by preventing sensitive places to emerge in the first place (by spatial policy).
[9] Federal Office for Water and Geology (2000) Flood Protection: A Common Goal for Federal, Cantonal and Municipal Authorities
[10] Articles 17-18, Law on the protection of water

towards the legal aspects for planning and construction. The municipalities also have the responsibility to inform their inhabitants. The owners of buildings have the responsibility to adapt the use of buildings and to take measures if required. The Gebaudeversicherung Kanton Zurich (GVZ) is responsible for examination if required measures are taken and to advise the owners of the buildings.

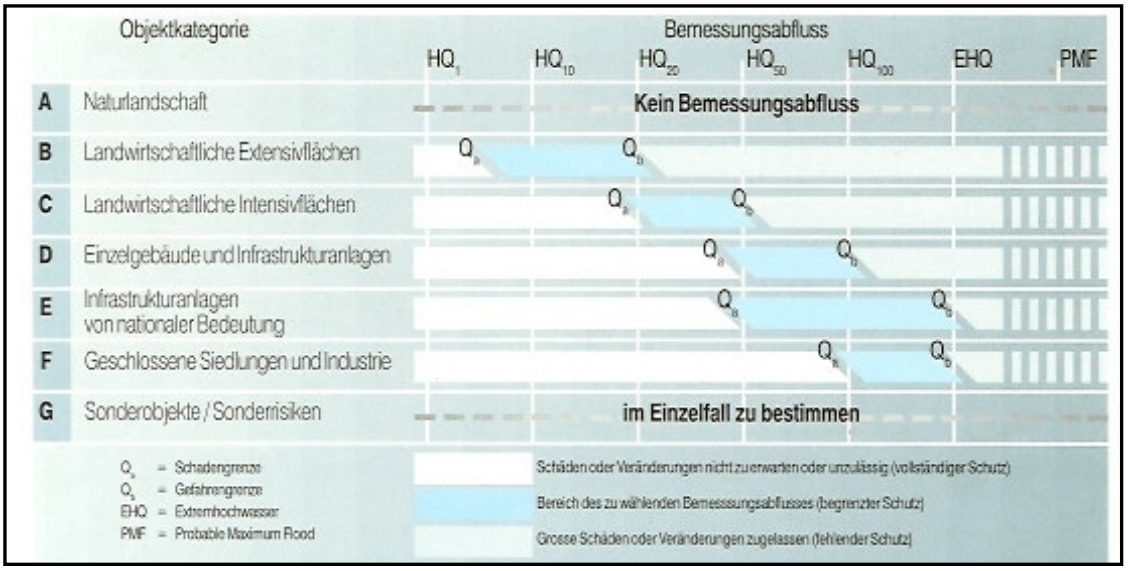


Figure 4: Differentiation of flood protection goals

Gebaudeversicherung Kanton Zurich (GVZ)
Of the 26 cantons 19 of them have obligatory state insurance, Gebaudeversicherung, Zurich is one of them. These state insurance companies are partially state owned and partially privately owned and they work on a non-profit basis.

The Gebaudeversicherung in Zürich offers insurance for fire and insurance against natural hazards, umweltschutz.

Since a few years they have been making danger maps and the use/implementation of these maps has known its ups and downs. After the last 'high water' occurred the use of the maps has gotten more priority again. In these maps three zones are identified namely, yellow, red and blue. The red zones are the so called no go zones, where building is no longer allowed, however maintenance of buildings that are already there has to occur. The blue zones have a medium level of risk and the yellow zones have the lowest level of risk. It is however always the best to build in zones that don't have any color and thus no water risk as such. Canton Zürich danger maps aren't very red, but do show a lot of yellow and some blue zones. As such flooding is not one of the big risks in Canton Zürich, damage is mostly related to hail, storms and melting water. Thus in canton Zürich water nuisance is more a local issue making it easier to oversee. In other more mountainous cantons however the maps show a lot more red zones making flood issues more complicated.

The maps are publicly accessible through internet, they are dynamic as they are updated on a regular basis. And with urban planning these maps have to be taken into account. The executer is the community/municipality in the end, so it is there responsibility to make sure that the maps are taken into account. In some neighborhoods a lot of blue zones have been identified so creativity is a must. On the

other hand it is also the responsibility of the government to adjust situations if for example blue zones dominate specific areas. They can do this by for example executing a river correction.

The focus for the danger maps is on existing buildings and to motivate owners to do something. For new buildings security measures have to be taken into account from the beginning. The Gebaudeversicherung Kanton Zurich (GVZ) provides concrete guidelines how objects can be protected for nature disasters. These guidelines are recorded in the *"Richtlinie Objektschutz gegen Naturgefahren"* and are used by the municipalities for acceptance of construction licenses. In this way it also becomes a guideline for architects and contractors.

When it comes to the insurance, owners should approach the insurance company, the insurance companies do however make check ups of the buildings (every 12/15 years) in order to keep track of the value of the buildings.

6.2.2 Prevention

Besides that policy towards prevention of buildings in danger zones, Cantons have the responsibility to take measures to limit the sensitivity of areas by making them robust and resilient to floods by means of collective measures. More and more projects are undertaken, often while taking the revitalization of the environment into consideration. One of the first example projects was the River Thur Revitalization Project which involves the cooperation of 5 Cantons, namely: appenzell inner Rhodes, appenzell outer Rhodes, St. Gallen, Thurgau and Zurich. The cantons have endorsed a principle that the 127 km river Thur with a catchment area of 1,750 km^2, is to become a 'river with a future for humans, nature and landscape'. Consequently the surfaces necessarily for flood control and any other type of land use are being determined in a binding but preparatory manner for landowners, on a case-by-case basis.
Participatory approaches in decision making have been implemented for; i) the determination of required spaces at the land use planning level; ii) harmonization of the landscape, which has been searched taking into account the requirements for continuity of living spaces; iii) planning of retention zones in areas prone to flooding, in order dissipate floods; iv) allocation of areas of little use to allow the river to develop dynamically; v) taking into consideration the opportunity of additional spaces for recreation zones.

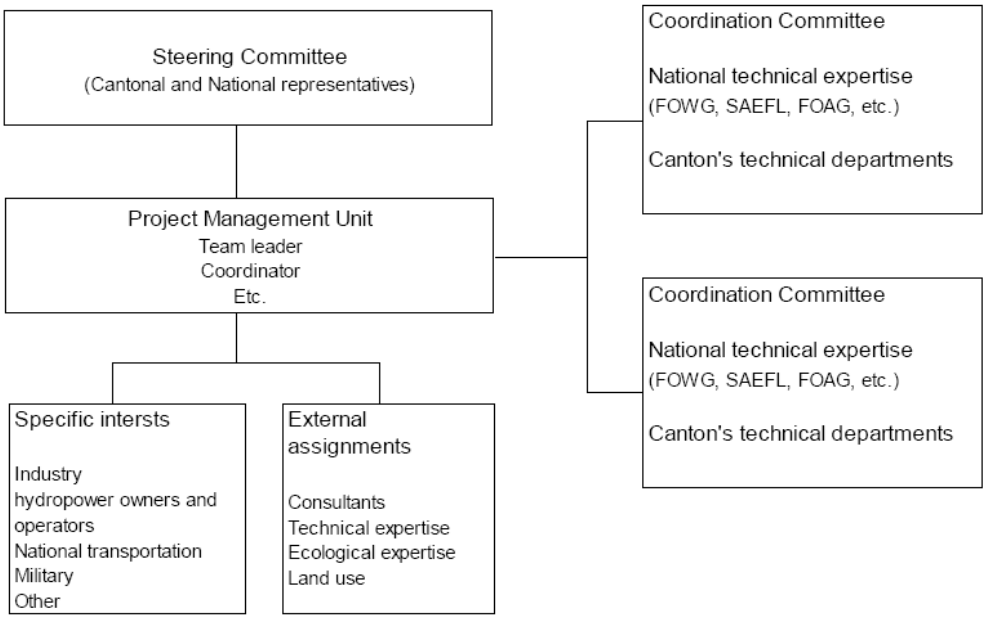


Figure 5: Structural chart of the River Thur Revitalization Project

Figure 6: The Thur at Altikon: in the year 1982 and 2003

6.2.3 Preparation, Evacuation / Crisis management and after care: essential strategies

Although the overall Swiss strategy is based on pro-action and prevention the message still is: be prepared for the unexpected. For this reason emergency planning and emergency concepts as well as specialized knowledge on-site are still crucial. And as natural hazards do not respect political borders - problems must be solved at the river basin scale. This happens normally on the level of the canton. They have a emergency communication plan in which, for example, is stipulated to inform and warn the population, the joint organizations responsible for watching dikes, and the joint organizations responsible protecting the dikes with machinery, etc. In this way the municipality and the fire brigade have the possibility to bring into action their resources and capacity. The emergency plan contains the water level when evacuation and temporarily measures need to be taken. As above mentioned, the insurance company of the canton enables reconstruction after damages occur.

6.3 Description of the governance system of spatial measures in relation with flood risk management

6.3.1 Who is funding which costs?

Since 2008, insurance companies, like the Gebaudeversicherung Kanton Zurich (GVZ), can contribute to measures to be taken in relation with flood risk management. Besides they give an advice and propose measures, the insurance company can contribute 30% to the execution of the measures. However this is only possible for existing buildings which are situated in the yellow zone. The motivation must not be the damage but everything around it. This policy/vision is aimed at prevention which aims that before a building project is executed a thinking process should take place, you can't build in red zones, in the blue only restricted building is allowed (construction in a way that no water can enter, emergency plan should be available) and in yellow zones the insurance company offers support.

When a flood takes place, Gebaudeversicherung pays once on “forbehalt” and will give an advice on which arrangements to make to make the building resilient against floods or other disasters. If the owner does not make the arrangements the insurance company won’t pay the next time.

In the field of flood control, the federal level must provide *compensation* regarding certain flood control measures. It *may* give financial aid for river restoration or subsidies for other flood-control projects. This is, however no legal claim.[11]

For the realization of the River-Thur Revitalization Project the financial aid was provided by the Canton of Zurich. This was done on sub-project basis which has the advantage that costs can be divided over the financial years. Besides small projects where financed, as an expression of goodwill and compensation, by the national high way projects which where executed in the same time.

6.3.2 Which ‘rules’ are applied upon these funds?

The Gebaudeversicherung Kanton Zurich (GVZ), as also the other state insurance companies, collects their funds through an obligatory collection of premiums.

Seven of the cantons don’t have state insurance and it can be estimated that they pay about 7 times as much premium. The benefit of having state insurance is that there is more flexibility in terms of money, in case of an emergency the cantons can cooperate and spread/divide money as needed, it functions as a kind of safety net. A division in this case would be done according to the size of the cantons and their pool resources.

Gebaudeversicherung Zürich holds the opinion that it is important to hold the premium at a stable level and argues that this is the main argument against private insurance. Also Gebaudeversicherung Zürich can contribute in case of a disaster whereas private insurance companies probably just opt to raise the premiums.

The Gebaudeversicherung in Zürich has existed for 200 years. From the paid premiums they have built up a money depot of about 50 million, the board decided to put the 50 million in the fund to motivate the owners. The Gebaudeversicherung Kanton Zurich presumes that this should be enough to cover the coming ten years. The risk climate is increasing and they are well aware that looking forward is important, the estimation is based on current research.

For flood control measures on a cantonal level taxation is used as the financing mechanism. The way how taxation is applied varies for every canton. Cantons which are not economical strong can be supported by the federal government by means of compensation. However their contribution seems to be limited.

6.3.3 What are the sources of these funds?

No information is available on this subject.

[11] Federal Office for Water and Geology (2001) Flood Control at Rivers and Streams, guidelines of the FOWG, FOWG: Bern

6.4 Reflections by influential actors in the governance system

6.4.1 What are the crucial elements of governance arrangements that could increase safety?

The Swiss flood protection strategy is often presented as proved and tested in the nearly 15 years of its presence.

And although the tasks have been increasingly assigned to the Confederation as a result of revision of certain articles of the Federal Constitution, the Swiss cantons still exercise a great deal of influence and power in the political arena whereby the implementation of most of the public policies regulated by the Confederation is assigned to the cantons, often with considerable room for manoeuvre (Reynard, 2002).

Also on an operational level the cantons are the central actors for flood risk management while the municipalities are the central actors for spatial planning. Good communication and cooperation is required to enable that spatial planning is integrated in the tasks regarding to flood risk management. This seems to work well. Municipalities do enforce spatial requirements of the Canton.

Long lasting river basin management works to protect people and property against floods requires full collaborative efforts of cantons. Although this has never been an obstacle for cantons[12] it is a crucial element as no clear regulations are in place. This is also applicable for solutions provided to individuals for flood protection. Extra costs are involved for tailor made measures for flood protection. It was noted for example that a concrete dam along the Thur was constructed for every private house in a different way.

6.4.2 How do subjects respond?

At the moment no real issues occurs for Switzerland in regarding to flood protection, meaning that no reforms are planned. The people involved in this subject in generally are proud of the Swiss system which is presented in number of conferences.

Issues of more concerns are for example the cantons which are not economical strong. Although they are supported by the federal government by means of compensation this has not much impact on the implementation of measures against flood protection.

On the level of protection of buildings for the so called no go zones, where buildings are no longer allowed (red zones) not much of them exist in, for example, the canton of Zurich. For the area with a medium level of risk additional measures need to be taken according to the "*Richtlinie Objektschutz gegen Naturgefahren".* Potential owners have the possibility to check if the existing building is in compliance with these guidelines. For new houses or new industrial initiatives the owner is responsible for all additional requirements.

The red zones are the so called no go zones, where building is no longer allowed, however maintenance of buildings that are already there has to occur. The blue zones have a medium level of risk and the yellow zones have the lowest level of risk.

[12] Anonynous (2003) Public Participation in River Basin Management in Switzerland, report part of the HarmoniCOP Project

6.5 Reflections by academics

Since the EUWARENESS project of 2003, no significant research is done in Switserland. The EUWARENESS is a research project on European Water Regimes and the Notion of a Sustainable Status. It aims to contribute to the implementation of the EU Water Framework Directive.

There seems to be no academical pressure to start research programs for institutional arrangements in the field of flood protection. From the other side the Swiss people are aware of the impact of climate change on flood protection.

The summary of a Position Paper of the Commission for Flood Protection of the Swiss Water Resources Society (KOHS) stipulates:

To date the effect of climate change on future flood events in Switzerland can only be defined in terms of trends. Experts anticipate that more floods will occur and that extreme values will increase. Current flood control principles appear to be far-sighted with regard to the expected impacts of climate change. Therefore they remain valid and have to be implemented consistently. The protection effect of existing measures has to be periodically checked. The potential for damage has to be evaluated and improvements are to be made if necessary.
For the evaluation of existing and for the planning of new protection measures, their performance with regard to overloading has to be established. If not already done, new projects need to be tested for overloading.
The design parameters (discharge, flotsam, bed load) must be defined with foresight in the upper spectrum.
Decision makers and other involved parties have to be informed on any need for action.
The necessary funds must be made available.

7 CASE STUDY: LOIRE

7.1 Description of the context

7.1.1 Geography and flood risk

The Loire river has been struck by major floods in mid 19th century, and recently with several minor floods. It is in France also the river where most experience with flood management at basin level has been built-up. Already in 1866, an engineer claimed that water should be stored upstream as a cost-efficient solution, but at the time there was no funding for such an investment, and the state developed dikes with outlets for controlled emergency flooding.

Figure 7: The Loire (www.eptb-loire.fr)

The Loire is completely dependent on rain, since the massif central highlands have no ground water, and summer flows are therefore low. The Loire has however been important for navigation in times when the English blocked Le Havre and by that also the Seine and Paris. Therefore, historically, the state has played a role in keeping the Loire navigable. There has been an expectation later that Paris would claim the Loire as a source of drinking water. However, this threat to the Loire has faded because after WWII several nuclear power plants were built on the Loire, and this requires a considerable summer flow. The nuclear plant therefore unwillingly also has done well to the ecology of the Loire. An influential green minister at the time was Brice Lalonde, and cooperation between ecologists and engineers at river basin level of the Loire took off (later these two ministries merged). Communication with the municipalities also improved, because municipalities started working together after a new territorial law enabling them to join their taxation systems, reducing competition between municipalities over attracting economic development.

To ensure enough summer flow for the steam cooling of the nuclear power plant on the Loire, two large dams were constructed by the state. However, these are not nearly enough to capture peaks flows when a serious flood is looming. In a city like Orléans 55,000 households live behind dikes, in Tours 110,000. These and many industries, are at direct risk in case of a 1 in 200 years flood. A 1 in 100 years flood would cause a damage of 3 billion euros, even if the dikes don't break. Another city under threat is Tours. The risk in terms of damage times likelihood of the event is today probably higher than in The Netherlands.

In the 1990s, flood management was an important objective, part of the Plan Loire (www.plan-loire.fr) was state driven development with the aim of integrated water management of the Loire. It was developed without the participation of the municipalities, and it was only aimed at improving dikes. Since municipalities have no role in the financing of dikes, they have not been involved (see hereafter). Spatial policies, fully in the hands of the municipalities, have not been linked to the Plan Loire.

7.1.2 Structure of the government

The CatNat system

According to the policies relating to Catastrophes Naturelles (CatNat), the citizen is responsible for his/her own safety, but also insured against natural hazards. According to a Napoleontic law, neither the state nor the municipalities are responsible for guaranteeing the safety of citizens or enterprises or to refund any

damages. However, they do take that responsibility in practice, at least to some extent, since they have the powers needed for setting out flood management strategies.

To explain this further, we first need to describe the general structure of government in France. The government in France is primarily divided between the central state and the municipalities, as indicated in the figure below.

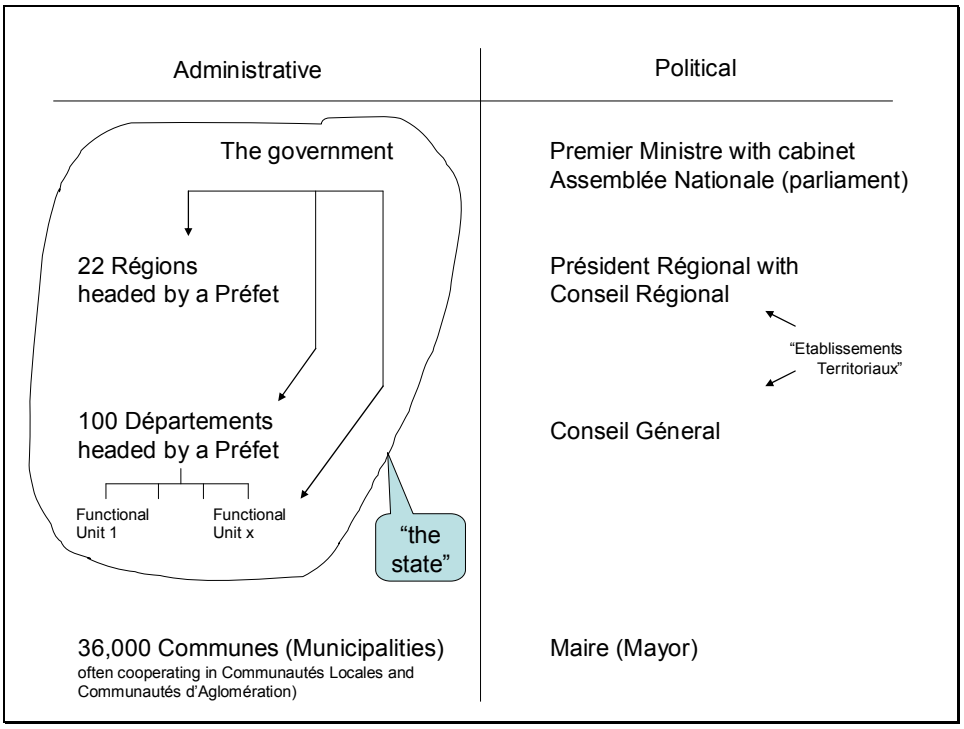


Figure 8: Main structure of French government

The French system is characterized as follows: there are only hierarchical power lines indicated those within the state. The political side of the Régions and Départements has budget but no other control powers. The polarity Premier ministre – Maire therefore strongly underlies the dynamics of the French internal political and administrative processes.

Intermediary levels are mostly built-up from these the poles State – Municipality, and have relatively little power. The different levels of elected bodies have no control over each other. This leads to the following general picture.

The State

Flood management is seen as a specific kind of risk management, which at state level always has been the responsibility of the ministry of the interior, which helps the Mayors to take adequate measures. Only recently, other ministries have become involved, in particular the ministry of ecology and environment (Ministère de l'Ecologie et Environnement), but only for the preventive component of flood management strategies (see www.ecologie.gouv.fr/rubrique.) To that end, responsibilities with respect to management of some major rivers, including the Loire, have been transferred to that ministry of ecology and environment from the ministry of public works. In general, the organizational structure of river management in France is complex, and it can be different in every water basin. The ministry of ecology and environment

also has the power to prohibit municipal works that increase the flow of the river under non-flood conditions, it can require transparency of flood risk during municipal spatial planning and private land transactions, and it can prohibit new urban development plans which speed-up the runoff of water.

This latter law is problematic, since despite enforcement by the Départements' Prefects, it is difficult to change the habits of urban development. On the other hand, municipalities are dedicating some personnel to this job, which is a start.

Also one or two PAPI (see below) have a special team for technical support to Mayors. Handbooks of how to develop new urban areas without increasing runoff are under preparation by the spatial development experts of the Départements. The fact that these are no water experts is encouraging (since now they can become more water-sensitive) as well as discouraging (since they often have no habit of communicating with water experts). In any case, design parameters are only based on a 1 in 10 years flood.

The state services deconcentrated at the Région and Département levels are very important in implementing national policies. In particular functional units are crucial actors in flood management. Two such functional units are the so-called DIREN and DDE, which are getting closer to each other after the merger of their principal ministries into the MEDAD (ministry for Ecology Development and Sustainable Land Use); the river management parts of the ministries of public works and agriculture were merged in 1992 in a new Direction de l'Eau, attached to the ministry of Environment/ecology. At the level of river basins, the DIREN/DDE are the representation of the state, having an important role as legal advisers to municipalities in relation to flood risk.

In other river basins, the MEDAD has set-up a successful flood preventive management program based on cofinancing. The PAPI program, aimed at river basin management programs called Plans d'Aménagement et de Prévention des Inondations, has activated all kinds of cooperation at river basin level to submit proposals to the ministry, and 50 of them are now in progressed stages of development. Increasingly, cost-benefit analysis is applied, though not based on regulations.

However, as above mentioned in the case of the Loire the state has traditional responsibilities in keeping the river navigable, and therefore an ad-hoc cofinancing is applied.

Powers related to use of land and (water) resources
Yet, in the case of flood management and management of safe land and water as scarce resources the following powers are the most critical.

- Taxation;
- Property rights;
- Spatial planning;
- Policing (enforcement of land use functions);
- Management of water works.

Having these powers would create responsibilities in the eyes of the public, even without having an explicit legal obligation to protect citizens against floods (which would make them legally liable for damage compensation).Therefore we focus on these powers.

In France, the municipalities are responsible for spatial planning and its policing, except for developments of national interest (e.g. highways, energy, river management), where the state has such powers. Together with the other Collectivités Territoriales (the political bodies of regions and departments, having their own

elections and budgetary discretions), have powers to build and operate public works like dams. Conversely, the 6 Agences de l'Eau (at hydrographic district level), and the numerous Commissions Locales de l'Eau (at catchment level), can develop plans, and for the Agences can levy taxes under the Polluter Pays and Abstractor pays Principles, but they cannot build or operate public works like dams. The idea of the Council of State (Conseil d'Etat, the highest administrative court in France), is that policy making should be separated from policy implementation, to avoid vested interests in (e.g.) the building industry to become to influential in decisions about use of budget. Implementation of public decisions involving public money spending should be done by bodies elected through general elections. Therefore the Agences de l'Eau do have the money, but don't have the power. Also, they have no explicit responsibilities with respect to flood management: to do so, they would need to have a specific budget from levies taken e.g. on impervious surfaces. Such levies were never created by Parliament. It was preferred to develop a superfund within the insurance companies, through the creation of a 6% increase on all car and housing insurance premiums in all the country. This system is called "cat'nat'" (catastrophes naturelles), and the additional premiums have risen to 9% and recently to 12%. But why is that so? Long time ago, with the French revolution, all land was handed to citizens, which led to a highly fragmented ownership which is still the case today. Land owners rights are strongly protected and except for building structures of national interest like motorways, only the municipalities can pose restrictions on land use. They also have a monopoly on the use of force towards citizens in relation to land use, and they have no custom of negotiating about that with the state in advance. Indeed, some local authorities are tempted to give building permits in risk areas, anticipating that local victims of damages would be compensated by the insurance superfund.

Collectivités territoriales (commune conseil général etc.) may form joint boards (same level of govt) or mixed boards (multilevel), and more recently the EPCI (établissements publics de coopération intercommunale - reinforced cooperation between communes) and EPTB (établissements publics territoriaux de Bassin), sorts of reinforced joitn boards at he level of catchments or river basins, but the law dicided that only the départements (conseils généraux) and the regions could be members, not the communes and not private actors.

The municipality

With respect to implementing strategies for flood risk management, the state's territorial services draft the PPR (plans de protection contre les risques), which should be incorporated in the local land use plans; in the end, the municipality is by far the most powerful planning level, having the prime responsibility for flood management as well. It is not obliged to protect its citizens, and the local political process is supposed to determine the right protection level against floods. As for taxation, municipalities have no funds earmarked for use on flood or river management. They only have a general budget, and therefore the local political process becomes crucial to flood protection. Money for flood prevention has to be defended every year.

An option of earmarked funding only exists at state level by means of the Cat'nat' system. However it could only be used after a flood to compensate damages, and not before in a preventative way. After some legal amendment, a small fraction can be diverted to prevention: Le Fonds de prévention des risques naturels majeurs, called Fonds Barnier.

Therefore, land use powers and powers of establishing a separate financing system for flood management are completely separated / divided between municipalities and the (national) state. The Etablissements territoriaux (the elected bodies at regional and departmental level) have no planning powers and no dedicated budget either. Like in the case for municipalities, any part of their budget they might dedicate to

flood management is voluntary and therefore must fit short-term political dynamics (i.e. the members of the Councils must believe it will bring immediate electoral gain).

A disincentive for municipalities to protect flood plains from development is that, in a context where municipalities are still very small, development then may move to the territory of another municipality, and this would reduce their local tax income. Since municipalities are so small, and dependent on local taxes, this is a real problem. This was somewhat reduced when a new territorial law was introduced in 1999. Three levels of integration going further than pre-existing joint boards (syndicats intercommunaux) were set up, namely; 1) the Communautés urbaines for major urban areas; 2) the Communautés d'agglomeration, for middle size cities and their surroundings; and 3) the Communautés de communes for rural areas.

In particular the Communautés d'Agglomeration were enabled to join the local budgets, which made it less harmful if flood policy made industries move to another part of the agglomeration: taxes would still accrue to the same joint budget. Another level of cooperation is the Syndicats Intercommunaux. The Syndicats are superstructures at river basin level to manage water quantity (quite in the line of the later EU Flood Management Directive). They have a kind of water parliament, consisting of elected people from participating municipalities. This parliament (like any elected body in France) cannot have ownership of works, and often they are only involved with water supply.

There is often a tension and distrust between the state research institutes (which are often competent authorities as well) and the municipalities. Therefore consultants have emerged which are independent from the state, like CEPRI (http://www.cepri.fr).

The role of the Mayor in France
The 36,000 Mayors (maires) have an important role. Only they are responsible for flood management at local level, since they are the only formal representatives of the government and elected at the local level as well. Therefore they are chief of police and can force citizens to respond to flood regulations, including those in the spatial plan. The Préfets or Conseils at regional and departmental level have no such powers. About 8,000 communes are concerned with flood hazards on their territory.

Powers related to ownership and use of land and water resources
According to ancient Roman law, ground water is private, small surface water belongs to the owners of the river banks (each their side of the river), and large rivers belong to the State. You may use, but you are also responsible, for the use of what belongs to you. Later, the emphasis has shifted to water remaining private, but it should be used wisely.

Because of the link between land ownership and water use, land ownership has become more important. Any restrictions or prescriptions on the use of water or the way the water is managed immediately becomes a matter of the legal relationship between the government and the private individual. Presently it is the state requiring local actors to behave prudently with respect to flood risk. The tension between the state and private land owners is enlarged by the position of the municipalities: the mayors depend on support of their citizens, which form their electorate. There is no habit of compensating land owners for land devaluation through a formal acceptance of high flood risk ("servitude d'urbanisme"; "servitude de service publique"). If a land owner feels harmed, it is him that has to prove this harm before a court. There are not many municipalities willing to provoke such behavior. The budgetary consequences for many municipalities would be disastrous. Investors would move to other municipalities. Due to recent developments, it has become easier to share transfer building rights from one area to another (this might

help in relocating land functions or valuable development options away from flood prone areas). There are several 'floors' where building rights are shared in a pool with other people. This idea was first conceived in Savoie the Alp Départements; this became possible by separating landownership rights from user rights (the latter is less strictly protected).

Also the national government has no habit of contributing to financial compensation of damage caused by municipal decisions. The whole situation is therefore in a deadlock. There is hardly any discussion about this sensitive issue. Any discussion between the State and the Land Owners about changes to compensation and expropriation laws or the way they are applied is therefore also a discussion with the Municipalities. The three have deadlocked each other. This is why the PAPI may be partially successful, the real advances in flood risk reduction, which are technically and economically feasible with a reasonable discount rate of future benefits, can however not be made.

The Mayors therefore have very limited capability to manage private land. This is one of the causes why 15% of river dikes in France is not managed, and even the owner is unknown.

The Public Territorial Catchment Area Corporations EPTB (http://www.eptb.asso.fr)
A law dated 30 July 2003 recognized the Etablissements Publics Territoriaux de Bassins (EPTB) (Public Territorial Catchment Area Corporations) as key players in the prevention of flooding, the balanced management of water resources and the preservation and management of wetlands, on a river-basin and sub-river basin scale.

EPTBs are public corporations gathering "collectivités territoriales" (territorial authorities, i.e. Regional and Départements' councils). Currently there are EPTB in over 60 river basins. The participation of private actors and of municipalities in EPTBs is forbidden, but some pre-existing river boards were open to the direct participation of municipalities.

They act in compliance with the principle of subsidiarity, specifically in the area of flood prevention. This means they have little powers or funding of their own. In the case of the Loire, the EPTB (http://www.eptb-loire.fr/), with the specific acronym EPALA, is composed of 6 Régions, 16 Départments, 18 Municipalities with more than 30,000 inhabitants, and 11 Syndicats intercommunaux, where smaller municipalities work together. In this case the EPTB works together with the Préfet of the Region Centre as member of EPALA and coordinator of the plan, and with the Agence de l'Eau Loire-Bretagne. The role of the Agence de l'Eau (water agency) is however limited (see the box).

The Agences de l'Eau: exceptional powers recentralized in 2006 (and not for flood risk)
In France, all taxation systems must be approved by the national parliament, even the most local taxes. An interesting exception to this division of power are the Water Agencies (Agences de l'eau), which have been established in the 1960s, for the six main water sheds of France. These had a unique independence of the state. They were the only subsidiary institution with a functional aim and not under direct and full control of a body elected through general elections. Their board was composed only for one third of representatives of the central government, whereas one third were representatives of water users like industries and agricultural organizations, and one third were representatives from regional, departmental and municipal elected bodies.

This user-driven body had its own taxation system for functional use, as well as functional enforcement powers of use of land and resources. In France this was a unique combination. However, its functional capacities (power over land and resource use and its taxation) were limited to pollution and irrigation, and since it was financially dependent on these taxes which were quite modest, its regulative potential was limited. It had little capacity to undertake activities related to integrated water management, due to France's complex water system and the fact that there were only 6 water agencies.

In the 1970s, there has been a debate about expanding the powers of the water agencies to flood management. This occurred at the occasion of the Oise basin, where a discussion took place about a possible flood alleviation levy based on soil imperviousness (making it runoff faster). Every new levy had to be approved by the national parliament, which did not approve. The French treasury is a known opponent of parafiscality (functional taxation systems, and therefore always has been an opponent of the Agences de l'Eau. Any proposal for new taxation systems has to pass the fiscal committee in the national Parliament, where servants from this ministry have 50% voting power. The national parliament approved the original subsidiary functional system of the water agencies in a "weak moment" (on December 31 in the middle of the night), and has withdrawn these powers again in 2006, at the occasion of the implementation of the EU water framework directive. In return, the Agences de l'eau received slightly more funding. Experts of water (quality) management in France are worried about this development, since the balance of power between functional interests and general interests dominated by short-term political dynamics is lost.

The Water Agencies are said to have a role in integrated water management, since they are responsible for 6 integrated water management plans termed Schema Directeur d'Amenagement de Eaux (SDAGE). However, these are hardly relevant for flood management, since the only overlap is that the SDAGE finance some retention areas that have ecological objectives, and also entail benefits for flood prevention. Ecological objectives stretch to the limit of the responsibilities of the Water Agencies, which are not keen on expanding those further due to their limited resources, and no outlook on an increase of these, since flood management is a heavy responsibility: it is a matter of life and death. They would have to invite other governments to participate, but have little influence, since they are composed of water users and therefore are seen as reflecting one-sided interests.

Liability in case of floods
As indicated, Napoleonic law indicates owners of property cannot claim compensation from any government in case of flood damage. However, those who manage rivers and land development and therefore have the possibility to prevent floods have a moral responsibility. These are the owners of dikes (in the case of the Loire the State), and the municipality which has at some time allowed development in sensitive area, since some decades after receiving formal advice from the state.

7.2 Description of the Flood risk management system and chosen strategies on operational level

7.2.1 Pro-action

Pro-action is defined as measures to prevent water to flow to sensitive places. This can be either done upstream (limiting the speed of runoff) or by preventing sensitive places to emerge in the first place (by spatial policy). In the past, the strategy of prevention upstream has obviously been applied by building two dams, despite the fact that their objective was primarily to provide summer flow of cooling water to a nuclear plant. These dams have some extra storage capacity. However, other than this there is little debate about upstream measures along the Loire.

In the Loire basin, flood plains are still developed behind the existing dikes. There is little spatial strategy to prevent this, or to relocate sensitive destinations from hazardous locations. However, there is a law preventing development in the river bed outside the dikes, which would require a relocation of dikes and therefore a narrowing of the river bed.

An interesting case is that many tributaries of the Loire have half-open dikes. In case of a flood the dikes may be closed, and the water from the tributaries would be collected behind the dike, causing a local flood. In order to develop these areas, there are plans to provide pumping capacity. However, such a measure would technically be illegal since it would narrow the river bed in a virtual sense. It would need to be compensated by creating retention area upstream. There is one location where that still would be possible, although its economic feasibility is questionable. This whole issue is not raised at the moment due to its sensitivity (who would be paying the retention area?), and because the flood risks near the tributaries are not resolved as of yet.

Finally, new urban development, like anywhere in France, needs to be neutral in runoff-effects. This is enforced by the state. However, practice is much different; private developers don't have the skills, nor do municipalities have the capacity to enforce this. The secondary enforcement (of municipalities by the state) because of this becomes mostly ineffective, due to the economic interest of urban development.

7.2.2 Prevention

Prevention is defined as making a sensitive area robust and resilient to floods by means of collective measures. When after WWII the nuclear plant was developed on the Loire, the authorities were forced to cooperate on the dams (building of the dams, or the working of the dams?) and their implications. However, the Mayors did not participate where dikes were concerned, and they still don't. If one assumes that flood damage and casualties should be prevented, the risk is still high compared to international examples. Even the Plan Loire (www.plan-loire.fr) won't change that, although it is a big step forward due to the voluntary cooperation in a program where different parts of the government coordinate their action aimed at integrated river management. Yet, the key strategy adopted to achieve risk reduction is failing to achieve low risk levels.

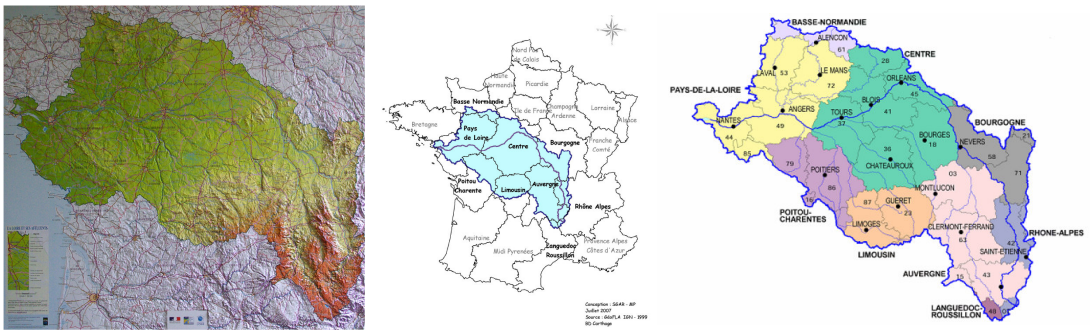


Figure 9: Basin of the Loire

The key strategy in fact is the building of dikes to protect developed areas. In the 1970s when this strategy was chosen in addition to the two upstream dams (before the 1970s dams were mainly used to keep the river navigable when the water table was low), there was no funding to close these dikes. The open dikes are still a risk, and elsewhere there is a significant risk of breaking dikes.

The risk is increasing, since hazardous areas are still developed (urban areas). This is the choice of the municipalities. From the point of view of the national parliament, it is sufficient if these public choices are made in a transparent process. Therefore, a national system exists following a 1987 Law, to enforce transparency about risks in local development plans. The Departmental Prefect (in practice the DDE/DIREN) prepare flood hazard maps and risk management plans (Plans de Prévention de Risques d'Inondation (PPRi) which the Mayors must annex to their draft local plans. They must indicate risk zones, but it is not compulsory to limit the risk of development to any specific standard. The only formal implication of not taking the PPRi into consideration, is that in case of a flood the victims will not be compensated. At present, the hazard maps are all prepared, and published on the Internet; out of 8,000 Mayors whose developed land has a flood hazard, 5,000 have attached a PPRi, made by the State, to their local plan. It is not known to which degree the recommendations of the PPRi have actually been adopted as part of the binding stipulations in the spatial plan.

Because the transparency law of 1987 did not really appear to have effect on development, the Assemblée Nationale decided in 2004 to add an extra measure to enhance transparency and awareness. Sellers of property are since then obliged to present an official municipal "status report" of risk to a prospective buyer. It has only been in force since 2006, since the State has to send an implementation letter to each of 36,000 municipalities, and its effects are yet unknown. First indications are that the way the status report is prepared and communicated makes a lot of difference, and since municipalities seem to have little interest to do anything that affects prices negatively, the effects may be limited.

If Mayors have not properly implemented these laws, they and their citizens are formally not entitled to receive compensation from the national flood insurance (see hereafter), if a flood were to occur. Yet, the economic interests of development are significant. Land owners are not normally compensated by losses due to a change of land function, where they would loose the option to develop their land. Municipalities have no budgets to fund compensation (or they should come from their general budget). If property would be located in a 'red zone', owners might relocate to other municipalities. All these circumstances make it very difficult for Mayors to consider the long term interest of flood prevention. In the current situation it is not beneficial for the Mayors to do so as it might affect their own chance of re-election negatively.

On occasion, this has led to a conflict with the state, which tried to enforce the maintenance of the red zones of the PPRi. However, at the end of the day, the Mayors get away with creating more risk. Under the

French context of an extremely sensitive relationship between the Mayor and the Premier Ministre, it is not attractive for the State to enforce this law and disturb relations.

In contrast the local development plans are really controlled. For example, if a land owner builds a new house in a Natura 2000 area (heavily protected under EU law), NGOs will easily win if they go to court, and the municipality has to compensate the owner if the Mayor has allowed the construction.

In any case the PPRi of the Départements, nor local development plans, have been considered in the preparation of the Plan Loire as relevant influences on future flood risk.

The Plan Loire
The Plan Loire is a cooperation between State offices at the regional and departmental level, cofinanced from the budgets of the Collectivités Territoriales: the political sides of the Régions and the Départements. The municipalities participate as part of the EPTB Loire (EPALA), where they influence budgetary decisions, but there is no participation of municipalities in terms of actions to be taken at the municipal level. Participants are: 6 Régions, 19 Départements, 20 big municipalities and 20 Syndicats of little municipalities. The state (i.e. the administration at regional and departmental level, both headed by a prefect) is explicitly not a member. The Plan Loire is much more informal than the PAPI, it is not required by any law and therefore has no status according to public law, and without clear objectives stated in advance. Its flood management component is exclusively about actions to be taken by the deconcentrated state services, and therefore about dikes and dams only. This does not preclude that the aims are integral, and include flood management. Yet, the scenario studies do not take the option of a change of urban development processes into consideration, and those part of the municipal organizations responsible for that (or for flood awareness) have not been included.

A 1999 EPALA brochure called Enjeux et dommages dans le lit de la Loire indicates that if the 1856 flood were to occur again, this time over 6 billion euro damage is still to be expected, taking the measures of the Plan Loire into consideration; most damage would be caused to enterprises. Since then, agreement about additional actions may have been reached, but not to the extent of a significant risk reduction.

The Plan Loire, despite of not being formal, has been very important to speed-up the informal attuning of actions between the participating organizations. It has served as an inspiration for other river basin plans in France.

7.2.3 Preparation, Evacuation / Crisis management and after care: essential strategies

Crisis management and insurance are both key strategies in France. Risk levels are somewhat reduced by precautionary policies, but do however remain considerable. The law indicates that Mayors are responsible for crisis management. They are assisted by the ministry of interior, which has general responsibilities related to security and hazards, and in the Loire the EPTB (EPALA) also has prepared guidance for Mayors about how to prepare their population for catastrophes. The Plan de Sauvegarde Communal is compulsory since 2004.

Linked to prevention is the System Catastrophes Naturelles (CatNat). According to this system, introduced after major floods in the 1970s but also aimed at other kinds of natural hazards, every property owner is insured against flood damage. The State must declare an event to be a Natural Catastrophe, after which all damage is compensated financially. It is based on a solidarity super fund, which is filled with a levy on

car use and on normal housing insurances in general (not specific or modulated for areas with flood hazard). The implementation of this insurance system has been left to private insurance companies, who demanded that the state would warrant enough funding if a major catastrophe happens that exceeds the available reserve. The state has become worried, and has increased the levy on car use and house insurances from 3% to later 6%, 9% and in 2006 to 12%. There is no link between the insurance premiums and the flood risk. Part of this damage covering budget is used to finance flood hazard reduction plans the PAPI, but the system itself forms no incentive to take flood risk into consideration when spatial development decisions are made. Although if a municipality has not taken its PPRi into consideration, it is not bound to paying flood damage.

7.3 Description of the governance system of spatial / defense investments and spatial restrictions

7.3.1 Who is funding which costs?

The bottom line is that there are no spatial measures with respect to flood management with any general application or system of financing in France, nor in the Loire basin. Insofar as the prohibition to cause extra runoff or flooding burden elsewhere through new developments entails extra costs, these would be carried by developers. However, the flood management policies hardly have any spatial consequences or financial implications for land owners in existing situations. This issue is too sensitive in France.

However, considerable budgets are spent on other (said to be less effective) ways to prevent floods: dams, dikes and to a limited extent (not in the Loire basin) retention areas. This is done entirely on a voluntary basis and from general budgets. The PAPI-based co-financing by the State (the Ministere de l'Ecologie) is speeding up that process.

Finally, the PPRi form the basis for measures to make individual property more resilient to flooding, so that damage will be limited. The co-funding of private expenditure comes from Fonds Barnier.

Les PAPI and State financing of flood management
The PAPI is not applicable to the Loire basin, but an interesting financial incentive to make Mayors more susceptible to a conscious flood risk strategy. It is a promise of co-financing on the condition of cooperation at basin level. It is somewhat similar to the European Union structural funds which functioned in a similar way, and also successfully challenged local actors to cooperate. The ministry of ecology, when they started the open tender in 2003, inspired by the structural funds, expected 15 proposals, but they received 100. At present, 50 have been awarded, with a total budget of 1,5 billion euro. Of this budget, 400 million is provided by the Fond Barnier, the national solidarity tax. (It does not include national efforts done on flood forecasting, nor the production of PPRi.) It has been an incentive for municipalities to organize according to cooperation called Syndicats. The State funds are not related to spatial measures, but only to public works.

In the Loire basin, which is not eligible for a PAPI, the Ministère de l'Ecologie has traditionally spent a non negligible budget on the Loire, and this is followed up today by funding the integral Plan Loire. About 30 years ago it requested the Conseils Régionaux and the Conseils Géneraux, receiving their funding from the central state but also having their own discretion about the spending of that budget, to contribute, which they are not obliged to do. For example, the Conseil Régional of the region seated in Orléans (Région Centre) has a total annual budget of 600 million, and it spends 17 million in 7 years on flood management (see appendix). The municipalities do not contribute at all, not even after the existing action

programs were joined to form the Plan Loire. The Plan Loire has been prepared on the platform of the ETBP Loire (EPALA), of which the municipalities are member. However the municipalities do not participate financially in the Plan Loire itself, and were not involved in its preparation. They were however involved in the voting about the strategic and operational plans of the Plan Loire. Details of the financing are indicated in the appendix.

7.3.2 Which 'rules' are applied upon these funds?

In general, taxation in France is general, and decisions about uses of tax money is made by elected bodies which are solely allowed to implement the associated works. The budget spent on the Plan Loire is the result of a voluntary negotiation between its partners (elected bodies), and the rules for spending this budget by the State, which can build works, have been developed on ad hoc basis for this plan. The Plan Loire's main strategic document indicates the procedures are complicated because of co-financing rules agreed between the partners which should be simplified.13

The absence of functional taxes, earmarked for spending on flood management, is widely seen as an obstacle for developing effective flood policies at the municipal level, including spatial measures. The fact that the budget is yearly under review by elected bodies which change every six years, and allocations may therefore be adjusted significantly, the reliability of partners toward each other is reduced along with the possibility of long term participation of municipalities in programs at basin level.

Insurance companies, responsible for managing the Fonds Barnier, have little incentive to be concerned about flood protection, since there is hardly any credible link between flood prevention and the benefits in terms of prevented damage. They do not pose any rules to those who are insured and claim damage. Development decisions are not influenced[14]. Officially, damage is only compensated if the PPRi has been followed-up, but in practice many doubt whether the State will compensate such damage to begin with. In 1982 a law about the CatNat insurance and the Fonds Barnier was approved that needed to be implemented. Since no government service was capable of doing that, the private insurers were asked to do so, and they demanded that the State would complete the required budget if the Fonds Barnier would become depleted. The Fonds Barnier is not actually a large fund as such, and in case of severe flooding, with over 1.5 billion of damage in a year, it will not be sufficient. It is only a good system for little floods. The Ministry of Economic Affairs, responsible for the CatNat system, has identified this as a risk. In certain years to many Mayors have frequently asked compensation for catastrophes that could not be officially classified as such, but were rather a result of bad spatial planning in the farther past (before the PPRi system entered into force); it often concerns yearly flooding events.

Finally, municipalities do make costs to implement the laws that forbid developments that have an effect to speed-up runoff and floods.

[13] Document stratégique interrégional sur les suites du plan Loire grandeur nature pour les années 2007-2013. Bassin de la Loire : un territoire à vivre ensemble, des ambitions à partager Version adoptée après concertation et avis favorable du Comité de bassin Loire Bretagne, du 30 juin 2006.

[14] A little NGO has been established to protect the interests of the private insurers and not-for-profit insurers called mutuelles.

Transfer of funding from cities to upstream retention areas
The Loire basin hardly has economically feasible opportunities to create upstream retention. However, in the Meuse and Oise-Aisne basins (and probably in a few more basins), municipalities actually pay land owners upstream for keeping their land available as retention area.

In the case of the Meuse1, the city of Charleville-Mézières wants to build structures narrowing the river bed, whilst there have been severe floods in 1995 and 1999. The municipality is obliged to compensate this by retention measures upstream. They intend to do this by means of retention dams which are only closed in times of flood. Here, in the EPTB EPAMA, the municipality works together with the Région and three Départements. They have to buy only a strip of land to build an open dam. Agricultural land owners will be compensated for their damage in the case of a flood, and for a devaluation of their land price, but these are expected to be both insignificant amounts in this area. Contracts with the farmers have been signed. It is disappointing that this is the only result after 3.5 years of negotiation, even under these relatively simple circumstances. A law of 2003/6 requires a public discussion of such measures and compensation.

This development is probably driven by a sense of urgency due to a history of flooding, in combination with the legal obligation since 1987, amended 1992, to compensate activities in the river bed.

In the case of the Loire, there is only one technical option for such a retention zone, but this will cost 100,000 million euro and is not really attractive. Also, there is no direct legal need to compensate works in the river bed. (Elsewhere it is described that there might be such a legal need, if open dams are closed downstream and pumps installed to keep areas behind dikes near tributaries dry during floods, but this is not discussed in the open.)

[1] See : Aménagement de la zone de ralentissement dynamique de Crue de Mouzon. Etablissement Public d'Amenagement de la Meuse et de ses affluents (www.epama.fr)

7.3.3 What are the sources of these funds?

All budgets for flood management come from general budgets at State level. Some of this becomes available via the Conseils Régionaux and the Conseils Généraux, which have their own discretion to allocate State funds. The State budget is for a relatively small part of 400 million euro per year, the part coming from the Fonds Barnier, earmarked to be used for flood management. The Régions are the main non-national contributer, and the only French Département contributing significantly is that of the Loiret (seated in Orléans). Its Conseil Général has allocated 3 of its 600 million to flood management, half for maintaining dikes and recently a 1.5 million extra for supporting little municipalities, in order to protect their own properties, and even to compensate some flood damage (300,000). (The Fonds Barnier is not available for the protection or damage compensation of the properties of municipalities.) This is not a lot of money, but it may be a first sign of a reversing trend in France. Three Conseils Regionaux in the Loire basin have all made available 5 – 20 million subsidy per year, an amount matched by the national state.

The fonds Barnier is part of the the whole superfund insurance system called CatNat. CatNat produces around 3 billion euro per year, and Barnier fund is a small percentage of that. The money of cat'nat' is essentially used to pay post disaster damages (floods, avalanches, landslides, earthquakes and volcano eruptions), while the Barnier fund is used to prevent disasters, i.e. paying in advance rather that after the event. The total annual income in this fund is presently around 50 million euro, whereas the total expenditure is more than double of that amount (see the figures in the box from an official financial progress report to parliament). The fond Barnier seems to have dried-up.

A few texts on the Fonds Barnier (du projet de loi de finances 2008)

8,3 millions d'euros d'autorisations d'engagement et 7,1 millions d'euros de crédits de paiement sont consacrés aux plans de prévention des risques naturels (connaissance, information et élaboration). Ils correspondent notamment à l'élaboration de 300 nouveaux plans et à l'approbation de 400 d'entre eux en 2008 » Ces actions sont financées à 25 % par des crédits budgétaires et à 75 % par des crédits du Fonds de prévention des risques naturels majeurs (FPRNM, dit Fonds Barnier). (…) la réalisation des objectifs ci-dessus mentionnés dépendra de la possibilité de mobiliser les ressources du Fonds Barnier, dont la situation financière est précaire. En 2007, la trésorerie du fonds a ainsi conduit à arrêter une programmation ne couvrant que les deux tiers des besoins, sans pour autant empêcher son « assèchement total ».

(…) les rapporteurs spéciaux du Sénat "se sont inquiétés des ressources insuffisantes du fonds de prévention des risques naturels majeurs dit "fonds Barnier" et ont regretté que le renforcement des moyens consacrés au contrôle des installations classées ne soit pas à la hauteur des engagements pris au lendemain de la catastrophe AZF.

En effet, suite à l'élargissement progressif de ses missions, le Fonds Barnier, dont les disponibilités seront nulles fin 2007, devrait voir ses dépenses osciller entre 135 et 170 millions d'euros par an entre 2008 et 2012. Parallèlement, ses recettes resteront de 52 millions d'euros par an si le prélèvement qui l'alimente sur le produit des primes et cotisations additionnelles relatives à la garantie contre le risque de catastrophes naturelles n'est pas augmenté (cf. tableau). (…) La question des ressources du Fonds Barnier étant intimement corrélée à celle du régime d'indemnisation des catastrophes naturelles, l'examen de cet amendement sera par ailleurs l'occasion d'obtenir du gouvernement de précieux éclairages sur la réforme attendue de ce régime.

Evolution prévisible des dépenses et des recettes du Fonds Barnier (en millions d'euros) (covering all kinds of risks, not only floods)

	2006	**2007**	**2008**	**2009**	**2010**	**2011**
Expropriation	4	11	14	12	12	8
PPRN	15	12	15	16	16	14
Mesures de prévention	31,9	27	40	36	30	20
Etudes - travaux des collectivités	33	33	98	96	92	93
Séchilienne	0	2	2	3	7	12
Total	85	85	169	164	157	148
Prélèvement loi sur l'eau	0	22	0	0	0	0
Total dépenses	**85**	**107**	**169**	**164**	**157**	**148**
Recettes	**31**	**52**	**52**	**52**	**52**	**52**

Source: http://www.senat.fr/rap/np08_11/np08_11_mono.html and the site of the Institut de risques majeurs (http://www.irma-grenoble.com/01actualite/01articles_afficher.php?id_actualite=226

7.4 Reflections by influential actors in the governance system

7.4.1 What are the crucial elements of governance arrangements that could increase safety?

The municipality as central actor

Risk management in general is regulated under safety and national security, and therefore centralized under the ministry of the interior, with implementation at the local level. However, prevention of floods is different. There, the municipality is the central actor, since it has spatial powers that are crucial for implementing flood risk strategies, and which the State cannot control.

Financial arrangements

Flood management strategies are dominated by the complexity of their financing. As soon as it is not too difficult to get the money together, things may start moving. The most costly parts of flood management strategy are the following (in estimated order of costs in the Loire basin):

- Prevention through building dikes (79 million in 7 years): financed by the state (as formal dike owner) together with the Conseils Régionaux (as interested in well-being of their electorate).
- Making built-up areas more resilient (less vulnerable) to flooding: The State pays via the national CatNat system, the Fonds Barnier dedicated to natural hazards, which is indirectly paid by all car owners and households. The European Commission through its structural funds finances contributes 13 million euros in 6 years.
- Compensation of flooding damage: Fonds Barnier. A little part is compensated on ad-hoc basis by the Département Loiret from its general budget.
- Prevention of extra runoff by new urban development or by building in river beds (the latter may require compensation by developing retention areas upstream): this has to be financed by the developers.
- Adjustment of spatial plans: if this were to instigate costs for land owners or land users, such cost will not need to be compensated by the municipality. However, in practice such decisions are hardly made and there are little known losses or payments.

Functional forms of government

The EPTB Loire EPALA (EPTB stands for Etablissement Public Territorial de Bassin) serves as a legal form of cooperation that can serve to represent elected bodies at the basin level as a contract partner with the State and with the European Commission. It has no powers and 75 principals.

The State (the departmental Prefect) is responsible for enforcing transparency about flood hazard from municipalities. In the case of proposed development and land transactions, it provides risk information.

The Water Agencies have no responsibility for flood management and only contribute a little if areas developed for ecological purposes have a slowing down effect on runoff. In the case of the Plan Loire, the Water Agency does contribute 1 out of 261 million in 7 years to flood management objectives.

7.4.2 How do subjects respond?

No spatial measures

Because of the fundamental powers of the Mayors, and the absence of earmarked money, everything becomes negotiable. Spatial measures for flood management, which would be feasible from an economic view, are not implemented due to the fact that there is no mechanism that insures that beneficiaries of such measures are also the ones that pay. The exception is liability for extra flood risk from those who plan new urban developments.

The CatNat system is said to have perverse effects in the sense that it stimulates development in hazardous areas, under the assumption that this is insured. Where officially the insurance is only valid if the development follows a local development plan that fully meets the recommendation of the State's (department's) PPRi, there is a general expectation that the state will compensate damage anyway.

Cooperation depends on a continuous political sense of urgency

Prevention strategy is mostly financed from general budgets of the State and the Etablissements Territoriaux. These budgets have to be defended every year against other priorities, which requires a continuous sense of urgency, and a continuous sense of trust that other parties will continue implementing their part of the deal. Because flooding occurs regularly, and in particular because this gives the Conseils Régionaux an opportunity to make their socio-economic policies visible to the electorate, this voluntary build-up of political will continues.

In this force field, no actor has the power, legislative or financial, to manage floods at the river basin level. Essential powers are shared between the State and the Municipalities, of which there are many. The competition between municipalities (in fact between the Mayors themselves) about attracting economic development hampers a dialogue about working together in the field of spatial planning to address floods. Municipalities are not interested in doing anything that would hurt the economic interests of their citizens or that might chase investors away to a neighboring municipality (because these mean tax income). Compensating land owners for a change of land function to foreclose new development is not obliged, except for retention areas. In practice it is not done at all. The cultural setting, where the State dominates most forms of organization at larger geographic scales, does not favor these organizational forms as platforms for negotiation about land use transfers.

The EPTB stimulates cooperation

The EPTB platform is not capable of motivating municipalities to participate in the general river basin plan from their capacity as spatial planner. This is not the culture, and the general tension and distrust between Mayors and the State is not favorable. Moreover, the administrative complexity of the Loire basin is so complex with 75 principals, that anything more ambitious than wrapping up existing plans is unlikely. On the other hand, the informal process creates more understanding and makes less complex transfer options between subsets of principals visible, and therefore probably has influenced the unilateral plans. The overall outcome at a formal level then looks like spaghetti, since informal adhoc subgroups cannot make any formal decisions. They just can be effective if other bodies, formally members of the EPTB but not participating in an informal negotiation, don't stand in the way

Every year there is discussion about the competency (competences) of the EPTB. It doesn't really have one, other than being a contract partner with the state and with Brussels (it receives 13 million from Brussels structural funds in 6 years, and is the only one in Europe who receives that for flood management). The cofinancing-tendering arrangements are a real incentive to cooperate. Interestingly, the municipalities (39 out of 75 members!) are allowed to vote without contributing financially. Decisions of internal organization are their own affair.

Public awareness

In the current situation, no actor feels responsible for creating real public awareness about economically feasible (spatial) options to deal with flood risks. The municipalities, not being able to compensate the damage of land owners and not helped to that end by the State, are worried about their electorate. The State has no responsibility for these spatial measures, and communication with the public over the heads of the Mayors would be too sensitive.

7.4.3 To which dilemmas does this lead?

The impossibility of functional authorities
Flood management is not a sexy issue for general governments, since benefits of funds spent are uncertain and will occur only in the future (unless the public is highly aware of risk), whilst if there is a catastrophe, their self-declared responsibility will make them vulnerable to criticism: everybody counted on them, and they have failed. The cultural context however prevents the French from putting functional authorities in place that can orchestrate the process needed to agree on spatial flood management options and to finance them to some considerable degree. This cannot be the State, because of the tense relationship it has with the municipalities in relation to spatial planning. The implication is that there is no possibility to introduce earmarked funds that are at some distance of the general political process and therefore subject to short-term thinking. Experts indicate that this is a dilemma, since such solutions do not fit the French governance culture. The fate of the Agences de l'Eau, the only exception to this rule (and not competent in flood management), is illustrating.

Culture of governance forms
A formal link between spatial planning and river basin plans is unthinkable in the French context, due to the dominance of the polarity State – Municipality where Mayors are incapable of taking responsibility without cooperating with the State from the start, which has all the resources needed. Nobody can actually imagine that spatial plans would be attuned to water management plans in the administrative process. The formal tensions dominate over the possibility of informal cooperation to a mutual end. Citizens, companies and municipalities cannot imagine sharing the reflecting process on their spatial development with others. The cooperation is too complex, it does not belong to French planning culture, and the general tension between the State and the municipality dominates this thinking. The Plan Loire has activated municipalities in this process, not in a paying or spatial planning "mode", but it is an important first step in creating a platform for cooperation.

The State in its central and deconcentrated forms (especially at Département level) is omnipresent, because of the strong separation between policy making and implementation which is required in the French tradition and is constantly reinforced by the highest court when testing new legislation, the Conseil d'Etat. This liberal culture ensures a separation between policy making and budget allocation on the one hand, and implementation of works and of legislation on the other hand. The first is in the hands of elected bodies. The second is always in the hands of the State (except at municipal level). The central institutions having power to approve proposals for new taxation systems, which would be needed to make the financing of natural resources management less dependent on the short-term political process, are very weary of parafiscality, which they see as a risk for the financial integrity and robustness of the state.

Finally, the CatNat system with its Fonds Barnier is said to be a disincentive to responsible behavior, but it is not attractive for general elected bodies to introduce an insurance system that is less based on solidarity and more on responsible behavior.

7.4.4 Which new arrangements are proposed to solve these dilemmas?

In this context, it should be acknowledged that considerable social capital has been built up through the EPTB Loire and elsewhere through the PAPI. The system creating transparency about the effect of planning decisions on risks and forbidding certain decisions that enlarge risks elsewhere are not yet leading to a transition in planning practice, but under the surface a learning process is ongoing. Several triggers toward more cooperation and a potential transition in planning practices have been proposed in the interviews:

- In municipalities, the department responsible for spatial planning is usually not responsible for water management or flood management. Arrangements to make that link might be helpful. This is a responsibility of each municipality itself.
- A problem in France is to make people speak together, which is partly caused by the complexity of the issues. The PAPI program has been a great step forward because they form an incentive to cooperate, and further following this road may help.
- In an evaluation recently done by Cepri among 15 PAPI, a problem of governance was discovered, since most Mayors seem to be unaware of their flood problems or their possible contribution to the alleviation of flood hazards of others. They are not aware that governance structures that used to be only for river management now are important for flood management, and that this has spatial implications. This depends strongly on the local culture of governance. Behind this governance process are factors like tension between poor and rich areas, and issues of power and distrust. For example, what if the president of the cooperative structure is also the Mayor of the biggest city in the river basin? There is some experience with intermediary organizations, but it is questionable if that would be a solution. More attention to this problem is needed.
- Insurance companies have initiated some debate about the perverse effect of the national solidarity tax which fills Fonds Barnier. They would like to study the possibility to modulate the premium according to risk level.
- Making flood management (again) a responsibility of the ministry of public works, since it is richer and more powerful than the ministry of ecology. It is on the other hand doubtful if this would help, since it is well known that under similar conditions pushing harder only will generate more resistance. It might help, however, if the state were able and prepared to compensate damage done to citizens through a change of local development plans.

7.4.5 To which extent does the governance system reflect on itself?

There has been a remarkable learning process, especially given the contextual conditions which are so unfavorable for integrating flood management into spatial policies in a coordinated way. Now, people, including policy makers at the municipal level, believe floods can to some extent be managed in a sustainable way. The Plan Loire has done a lot of good, as it has influenced the evolution of plans, budgets and measures of the individual authorities. The Plan Loire has made the link between Economic, Ecologic and Social interest more visible. Apparently, out of the huge administrative complexity at river basin level, some cooperation can emerge.

Where formally first citizens and then municipalities and only third the State is responsible for flood management, in practice it is the State that takes most initiatives, and in the second place the Régions. The municipalities mainly follow by taking their responsibility to some degree. The State has introduced on its own initiative the following actions:

- The superfund for flood risk insurance and risk reduction (Fonds Barnier)
- The system linking flood risk transparency to local development decisions
- The facilitation of bottom-up cooperation between municipalities to reduce competition and increase economic of scale in making the administration professional
- Assuming direct responsibility for management of dikes as flood prevention measure, not only for navigability
- The form of the ETPB as an intermediary between State and Municipality
- The PAPI as incentive for financial cooperation between Etablissements Territoriaux and the State
- Regulations for catastrophe management

How can this be explained?
The history of a strongly centralized state and a revival of land owners rights after the French revolution still dominates. France is a deeply liberal country, like Britain: decision making should not mix up with implementation. Functional government with strong powers to common pool resources like “safe area” then becomes difficult. The untouchability of land ownership and the culture of not compensating a decrease of option value is paralyzing the learning process. This is not discussable in the tense relationship between State and Municipalities, and the municipalities have no interest in addressing this issue. This fundamental tension frustrates all discussion, since options which would require a change of land use would immediately find resistance, and doubt would strike in any cooperative processes aiming at such kind of scenarios.

Some suggestions to deal with this situation and possibly trigger a process of coevolution towards a transition of planning practices and associated regulations would be:

- There might be room for independent consultants to the municipalities, financed through an untouchable budget. Unfortunately, there is no organization that may credibly assist the municipalities in more integrated planning practices, since every possible institution belongs to the state.
- An option might be to allow competing consortia in a river basin to apply for funds from the state (PAPI) and the European Commission. Consortia with the most cost-effective proposals in terms of reduced flood risk would be rewarded. The EPTB are now formal organizations representing all elected bodies in a water basin. They are likely to follow the pace of the slowest participants.
- A discussion about risk sensitivity of Fonds Barnier would seem to be an effective trigger for a national debate on solidarity and responsibility, which itself may create sense of urgency for cooperation.

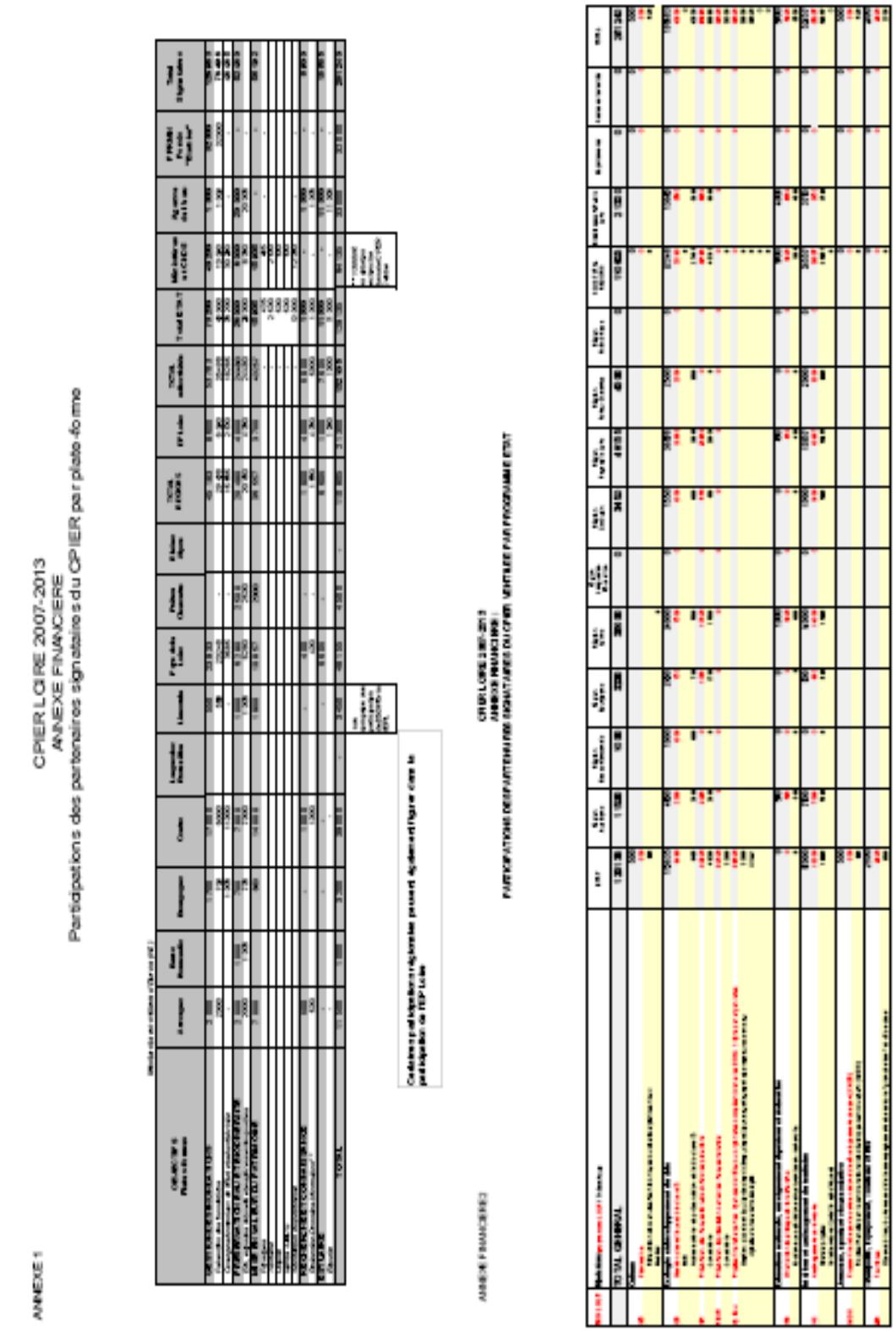


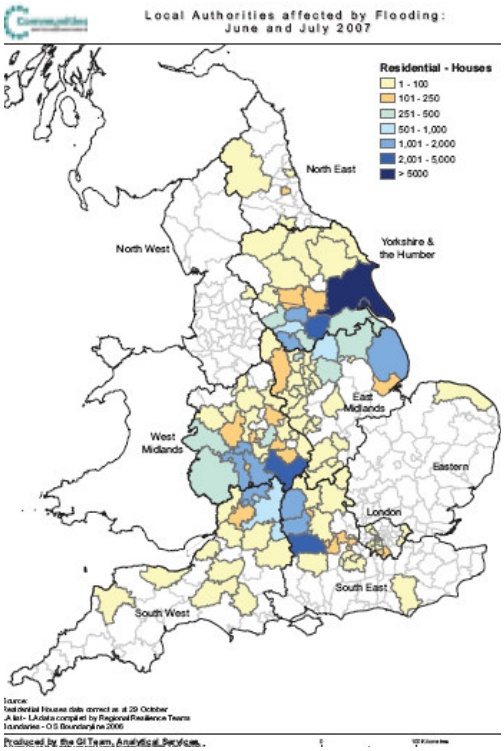
Figure 10: Financing of the Plan Loire by source and destination (source: Contrat de projets interrégional Loire 2007-2013 from www.plan-loire.fr)

8 CASE STUDY: ENGLAND

8.1 Description of the context

8.1.1 Geography and flood risk

The recent floods, most notably in October 2000, July/August 2007 and early 2008, highlighted the risk of flooding throughout the whole of England. The 2000 event was the catalyst for a significant increase in spending on flood risk management studies and schemes, which was principally focussed on rivers. The 2007 event highlighted the importance of sewerage/drainage systems in the study of risk. For example, surcharging of the drainage systems in Hull lead to extensive flooding, whilst the Tidal Surge Barrier and the associated defences on the Humber Estuary and the River Hull protected the city from a surge in the North Sea.



2007 was the severest weather-related event that the UK has experienced in decades, with approximately GBP 3 billion of insured losses (ABI 2007). It triggered an independent review by the government which, amongst other things, is considering the future roles of the public and private sectors, and the vulnerability of critical infrastructure (Pitt 2007). The interim report on the causes and consequences, which was published in December 2007, contained a number of urgent recommendations. All such recommendations have been accepted by the government and the final report is due to be published in June 2008.

Figure 11: Local authorities affected by the summer 2007 floods (Pitt 2007)

The flood risks in England are expected to increase significantly as a result of climate change (Foresight 2004). The average annual cost of flood events is forecast to double by the end of the century; this assumes the spending on flood risk management will increase in line with risk. Foresight concludes that by 2080, approximately GBP 22 to 75 billion of new engineering works could be required.

One of the principal issues which Pitt and others are considering is the roles of the various organisations with responsibilities in this arena. They are a mixture of private and public sector organisations, including:

The Environment Agency, which has permissive powers in respect of major watercourses; they do not have a statutory duty to protect against flooding.

The local authorities have permissive powers in respect of minor watercourses.

Both the above organizations have responsibilities for the coast, with the local authorities concerned with erosion and the EA flooding. The Environment Agency is taking more of a coordinating role.

The ten regional water and sewerage companies have responsibilities for the sewerage systems.

Internal Drainage Boards are independent bodies responsible for land drainage in areas of special drainage need that extend to 1.2 million hectares of lowland England.

The Highways Agency has responsibility for the drainage of motorways and trunk roads. The local authorities are responsible for the drainage of other roads.

British Waterways has responsibilities for the canal network.

Riparian owner is the term used for someone who owns a property next to a watercourse. They have rights and responsibilities under common law and, in theory, should undertake appropriate maintenance work.

More information on the principal organizations is given in Section 1.2

8.1.2 Structure of the government

The Environment Agency (EA) is a non-departmental public body and around 60% of their annual spend of GBP 900 million comes from government. Although they are independent, they work closely with government and report to Defra, the Department for Environment, Food and Rural Affairs. As their name suggests, they are the regulatory authority for a range of issues, not just flood defence. The EA operates out of a head office, 8 regional offices and 22 area offices.

With regard to flooding, the EA has permissive powers for what are termed “main rivers” and exercises its flood management functions through 8 Regional Flood Defence Committees. The committees comprise representatives of the local authorities and appointed individuals. They approve the capital and maintenance spending programmes for their region, which are financed through a system of block grants. Capital schemes are prioritised on a national basis, taking into account factors such as costs, social impacts and environmental benefits. A new system based on Outcome Measures has recently been introduced, which allows the government to set specific targets, such as the number of houses to be protected. The current target is to protect 145,000 residential properties over a 3 year period. Only the high priority schemes are financed in this way. The committees have powers to raise local levies to finance schemes, which are unlikely to be funded by Defra in the foreseeable future. The only proviso is that such schemes must be cost effective with a cost/benefit ratio greater than unity.

In addition to having responsibility for minor watercourses, some coastal defences and the drainage of minor roads, the local authorities also have a leading role in respect of planning. The EA is a statutory consultee in this process and comments on all proposed developments in the floodplain.

The water and sewerage companies are private organisations, which are regulated on a 5 yearly cycle by OFWAT (Office of Water Services). OFWAT sets price limits and the outputs to be delivered by the companies during a 5 year period, including, for example, targets to reduce the number of households subject to sewage flooding.

The Internal Drainage Boards are long established bodies and have permissive powers to undertake works to secure the drainage and water level management of their districts. They may also undertake flood

defence works on minor watercourses. This is similar to Holland, although the infrastructure is principally small drainage ditches and pumping stations.

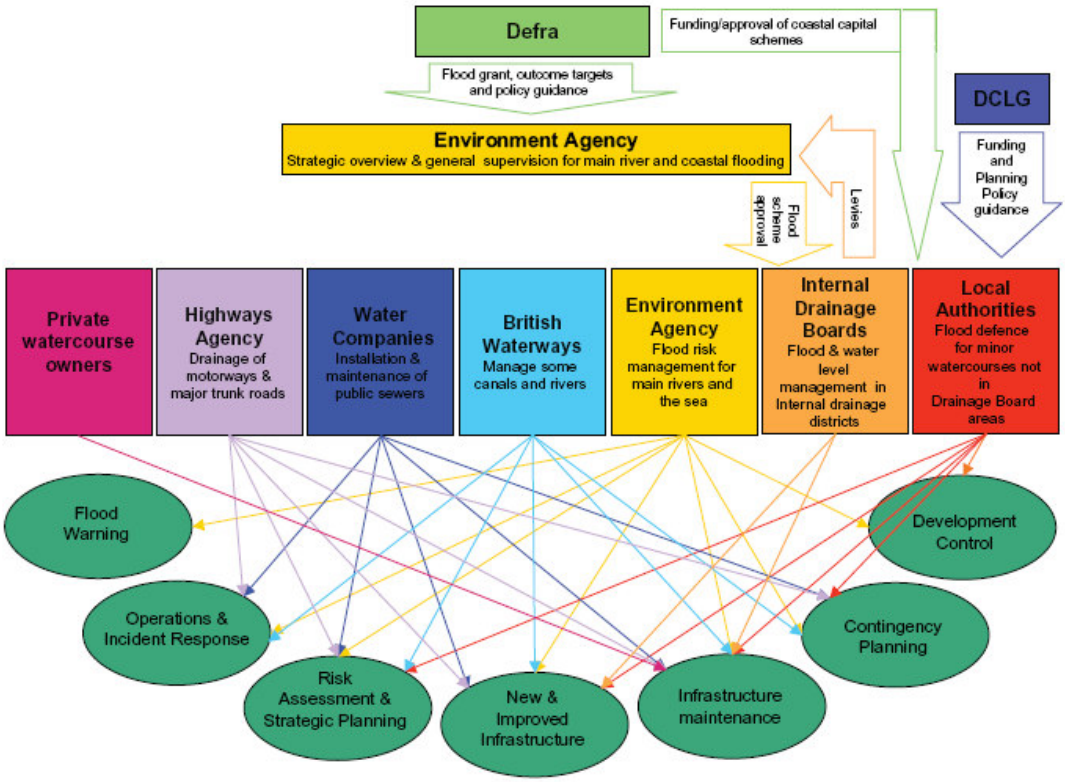


Figure 12: Responsibilities in flood risk management (Pitt, 2007)

The role of insurance companies

There is no statutory obligation to provide flood protection and householders can take out insurance against flood damage15. This is part of their general contents cover. Hence, the insurance companies are important stakeholders. There is a case that the cost of insurance against flooding should reflect the actual risk in an area and the trend is towards this. The Association of British Insurers (ABI) has indicated that this is some way off because it would mean excessive increases in premiums over a short period of time. Differential pricing has only been in use since the late 1990s.

With reference to Annex 1, ABI issued a “Statement of Principles on the Provision of Flood Insurance” in 2005. This states that the insurance companies will continue to provide flood insurance cover if the government takes a number of agreed actions to reduce flood risk. The insurance premiums and excesses will reflect the risk, but will be offered in a competitive marketplace. This is a non-formal agreement between ABI and the government. The government’s performance is reviewed each year and the contents

[15] Under the Anglo-Saxon legal tradition government does not provide individual support of flood victims. Very rarely, funds were channelled through local government (who are also supposed to be insured) for emergency repairs to public infrastructure under the so-called Bellwin scheme. After the 2007 floods however, government has provided relatively small amounts of compensation to individuals without flood insurance (Chrichton, 2007).

of the statement can be revised accordingly. ABI takes the view that unless government does more to reduce flood risk, they could withdraw the statement.

It is interesting to note is that some insurance companies, Norwich Union for example, provide information packages for their customers which outline how to put pressure on government/local authorities to improve flood defence in their neighbourhood. Norwich Union have there own flood risk map of the UK, which is used for business planning purposes. They commissioned specialist mapping and flood estimation projects prior to the publication of the EA's flood maps.

The National Flood Forum is a Registered Charity, which was set up by people who have experienced flooding. It was established in 2002 and aims to support communities and individuals who have been flooded or are at risk. They provide support, knowledge and the help they need to organise themselves, to manage the effects of flooding, to promote self-help and to campaign for flood alleviation. They liaise closely with the EA, the water and sewerage companies, local authorities, government, flood protection companies and ABI. They can provide information on all types of flooding including main rivers, minor watercourses, sewers, stormwater and highway drains, tidal and coastal flooding and groundwater.

8.2 Description of the flood risk management system and chosen strategies on operational level

8.2.1 Pro-action

Prevention takes place through the construction of flood defence schemes. There is a finite supply of money in any year to fund flood and coastal erosion risk management activities. Therefore, a fair and transparent system is required to determine how and where this money should be allocated in order to achieve agreed priorities.

Until recently, this was done using a national priority scoring system, which took into account costs, the reduction in flood damages (benefits), social deprivation and environmental benefits. A new system has been introduced which uses a series of Outcome Measures to achieve a balanced set of outcomes which deliver sustainable development in line with government policy. The measures are:

- Overall benefits in monetary terms
- Households at risk
- Deprived households at risk
- Nationally important wildlife sites
- UK Biodiversity Action Plan habitats
- Flood warning (flood risk only)
- Contingency planning (flood risk only)
- Inappropriate development
- Long term policies and action plans

As stated previously, schemes which are unlikely to be funded through the national programme can be promoted by the Regional Flood Defence Committees of the EA. These tend to be the smaller ones up to, say, GBP 1 million and which have a high profile in the area. However, in 2007 the Thames committee agreed to fund a GBP 10 million scheme in Banbury, Oxfordshire. Part of the scheme was funded by Defra and completed a few years ago but the remainder, a flood storage reservoir, was held up due to problems with land purchase. The scoring system in place in 2007 indicated that the remaining work was not a priority.

Studies are ongoing to identify ways to reduce the impacts/damages of floods on properties, through what is referred to as resistance/resilience measures. Defra and the EA commissioned a study of generic measures, including initial costings (Defra, 2007). The EA are undertaking a number of pilot studies into the provision of such measures. Currently, their use is not widespread. Householders are reluctant because they are afraid that this will negatively impact on the value of their properties and insurance companies often do not cover the additional cost of providing them following a flood.

Planning Policy Statement 25: Development and Flood Risk (PPS25) was published in December 2006 and it deals with all new or redevelopments. It outlines the methodology to be used for flood risk assessments, which are undertaken by a developer as part of any planning application. These consider in detail all the flood risks to/from a site and the surrounding area. PPS25 includes an "Exception Test" whereby development in the floodplain can be permitted, if the wider sustainability benefits to the community outweigh the flood risk. During 2006-2007, 13 major developments went ahead against the EA's advice (ABI, 2007).

The key requirements of PPS-25 are (Johnson and Priest, 2007):

- obligation on Regional Planning Boards to include a broad consideration of risk in developing their Regional Spatial Strategies
- local authorities to prepare Local Development Documents which seek to avoid flood risk to people and property
- local authorities to ensure that planning applications are supported by site-specific flood risk assessments
- local authorities to give priority to the use of Sustainable Drainage Systems
- local authorities to ensure that developments in flood risk areas are flood resilient and resistant, with safe access and escape routes

The process works well and since 2007, the EA are equally focussed on surface water flooding as well as fluvial and tidal flooding.

8.2.2 Prevention

The EA's website allows anyone to view the 100 year floodplain for the whole of the UK. It allows a householder to quickly establish if their property is in the floodplain; all that is required is their postcode. Legislation was recently introduced to make house sellers provide a vendors pack for potential buyers. Amongst other things, this deals with the known flood risk to the property.

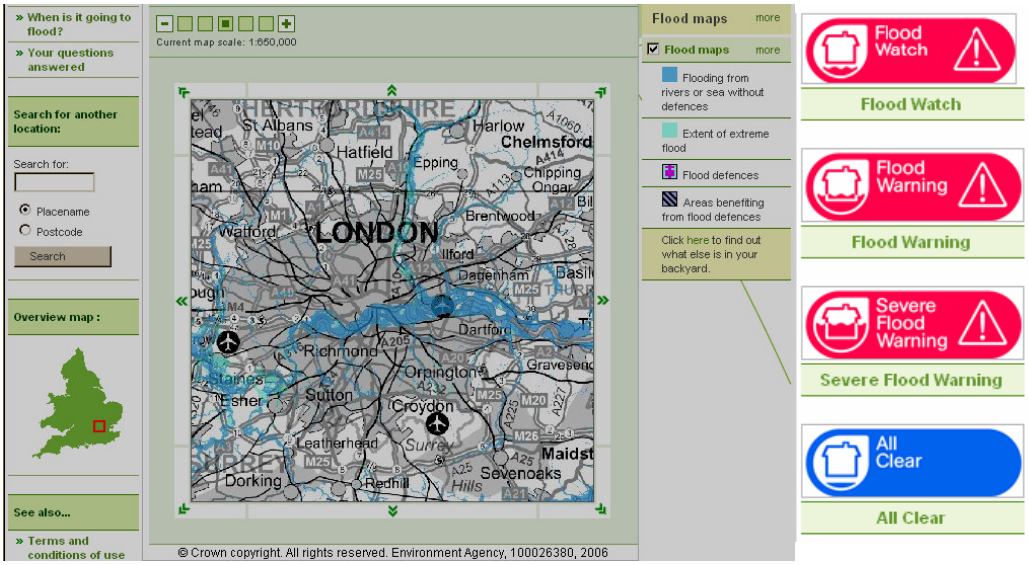


Figure 13: Example of flood risk map and flood warning codes from EA website

The EA has a national flood forecasting service and spent a significant amount recently upgrading the systems. They also provide flood warnings for fluvial and tidal events. No adequate warnings can or are given for pluvial flooding. Residents in the higher risk areas are provided with a free service called Floodline Warnings Direct. This calls their preferred telephone number and leaves a message when a flood is forecast. The Agency regularly has advertising campaigns to increase the uptake of this service, which is surprisingly low in some areas. For example, only 6% of houses in the flood risk areas of Doncaster have signed up for the service. The EA also produces leaflets to inform the public how to prepare for floods. These include ones on what to do immediately before a flood and how to better protect properties in the future.

8.2.3 Preparation, Evacuation / Crisis management: essential strategies

It is the responsibility of the local authorities to respond to flooding on the ground. The EA are involved with regard to forecasting river levels, the dissemination of warnings and working alongside other organisations. The police will get involved if there is risk to life. The fire and rescue service will be used to remove people from their homes, if necessary. The EA undertake regional and local exercises which simulate flooding and test the responses of all parties. A national exercise (Triton) was undertaken in 2004.

In 2003, the Local Government Association and the EA signed up to a joint agreement “Working Better Together”. Local authorities and the EA have powers and duties that complement each other in protecting the environment, and protecting and enhancing the quality of life for local communities. A series of individual protocols set out how the EA and each local authority can work better together to deliver these outcomes. “Fire and Rescue Issues” is one of the agreed protocols. These protocols are locally flexible, so targets and methods of assessing progress can be rewritten and agreed locally, within the agreed template.
There are three command structures which can be set up, depending on the severity of the event namely:-

- Bronze – generally only 1 site and under the control of the fire and rescue service
- Silver – normally a more widespread event and under the control of the police. The command centre is set up a local police station
- Gold – very big strategic event and under the control of the Chief Constable. The command centre is set up at police headquarters

The crisis management system was tested during the 2007 floods. The exceptional rainfall which caused the floods was predicted by the Meteorological Office. The EA provided flood warnings 2 hours before the event for some 80% of households. More than half of the flood defences tested were overwhelmed but only a handful failed. At the local level, there was a perceived lack of clear responsibility between the different responders, which hampered the emergency response. In the cases where (early) Gold Command Structures were set up, these proved to be effective in coordinating the local response (Pitt 2007).

A major concern was the failure of critical infrastructure, such as roads, telecommunication and energy and water supplies. For example, London Underground had to close 25 stations. At present, all the major utility companies are undertaking studies of the flood risks to their assets and mitigation measures. Pitt recommends a stronger coordinating role for government in this (Pitt, 2007).

8.2.4 After care

The government provides money to the local authorities that are affected by flooding, through what is called the Bellwin Scheme. This is to cover the costs of cleaning up, and repairs to roads and council housing. It does not cover any damage which was not properly insured against. The government has also successfully applied to the EU (Floods Fund) to cover some costs of the 2007 event.

The insurance companies bore a large part of the damages from the 2007 floods, which amounted to approximately GBP 3 billion. However, not all households had insurance. On average, 78% of households have contents insurance but in some of the areas affected by the floods, this figure is 25%. Also, underinsurance was a problem, for both households and businesses.

In general, the response of the insurance companies to the floods was good although some had difficulties in coping with the large number of claims.

8.3 Description of the governance system of spatial / defense investments and spatial restrictions

As stated previously, flood risk is taken into account by the planning authorities in their development plans and the planning process. Some 33% of the current urban development takes place in floodplains. Although EA is consulted prior to development, this advice is not binding. Last year, 13 major developments took place against the EA's advice. The EA informs ABI in cases where it advises against developments.

Flood risk assessments are undertaken by a developer as part of a planning application. These consider all the flood risks to a site and the surrounding area resulting from the proposed development. Guidance on flood risk assessments is provided in PPS252. It is interesting to note that the Agency requires new developments to be protected to the 100year level, plus 20% for climate change. Should such sites flood in the future, the owners have no comeback on the planning authority or the developer.

8.3.1 Who is funding which costs?

The following financial arrangements are in place for flood management schemes:

- Defra funds the Environment Agency through a system of block grants and their performance is monitored against a range of targets or outcome measures. The current level of funding is GBP 600 million/year, rising to GBP 800 million/year over the next three years.
- The Regional Flood Defence Committees contribute some GBP 25 million annually through local levies.
- For new developments, the developers are responsible for construction of any flood risk mitigation measures.
- In some cases, the Regional Development Agencies fund flood defences as part of regeneration projects.
- The local authorities raise funds for all their activities from the rates.
- The water and sewerage companies fund all improvements to the sewerage systems through their charges.
- Defra funds the Internal Drainage Boards and British Waterways.
- Government funds the Highways Agency.

8.3.2 Which 'rules' are applied upon these funds?

As outlined previously, the EA's spending on capital schemes is allocated by way of a national programme. Until recently, a priority score for each scheme was determined, taking account of factors such as, economics (cost/benefit ratio), social deprivation and the environment. The methodology is outlined in the Project Planning Guidance and the supplementary notes published by Defra. The social deprivation score prevents the funding being biased towards the more prosperous areas, where house prices and, therefore, the benefits are higher. This system has been replaced by a number of Outcome Measures which does the same thing but also seeks to achieve a balanced set of outcomes.

The water and sewerage companies are set targets by OFWAT to reduce the number of households which are at risk of flooding from sewage. At present, there is no link between where this money is spent and where the EA promotes schemes.

8.3.3 What are the sources of these funds?

Defra funding levels are set by the government and flood defence has to 'compete' with other issues, such as foot and mouth disease. The Regional Flood Defence Committees can raise local levies. The water and sewerage companies fund capital and maintenance work out of their annual charges to customers, as part of a regulated process.

8.4 Reflections by influential actors in the governance system

The EA and others do not have a statutory obligation to protect against flooding. This means that the individual's responsibility is greater. The principal factors are: -

- prioritization of the EA's flood defence schemes through the national priority system
- take into account flood risk in local land use planning and the responsibility of developers to provide flood mitigation measures for new developments under PPS25;

- the agreement between the insurance sector and government to provide flood insurance and limit flood risks through development of flood defences;
- raising public awareness of flood risks through the EA's flood risk maps, the provision of information when selling/buying property, etc.

A major concern is the fragmentation of responsibilities for the management of surface water. The role of the EA is being strengthened and will have an over-arching role for coastal flooding and the development of coastal management plans from April 2008 onwards. In his interim report, Pitt recommends that the local authorities should lead on the management of surface water flooding and drainage.

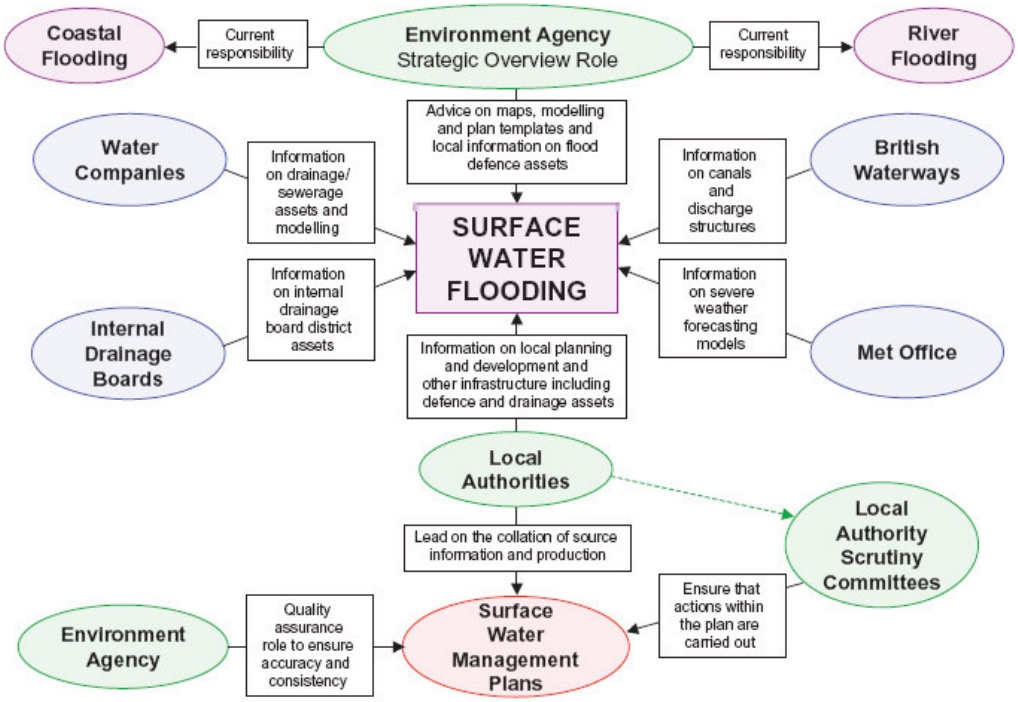


Figure 14: Proposed new surface water flooding management structure (Pitt, 2007)

Figure 4-1 shows a possible arrangement to deal with surface water flooding. The large number of players would remain in place, the EA have a coordinating role and the local authorities would lead in local water management planning. A Local Scrutiny Committee should monitor the implementation of these plans.

ABI is taking a tougher stance against developments that go ahead against EA advice. Options being considered include some kind of blacklisting by insurance companies, which will make it more difficult to obtain household insurance in those areas (and communicating this position to the developers and local authorities).

The agreement between the insurance sector and government is an interesting feature. A concern is the large amount of uninsured or underinsured households. It seems that (local) government did in some cases support uninsured victims of floods, which seems to contradict the general approach that government does not support individuals that do not take care of themselves.

Flood risk management in England is currently high on the agenda. Despite this, public awareness is not overwhelming, bearing in mind the low take up rate to services like Floodline Warnings Direct. Although

many services are available, this does not seem to raise awareness in the public. The floods themselves, of course, increase awareness, especially those that were affected directly. This tends to reduce with time.

9 CASE STUDY: LOUISIANA

9.1 Description of the context

9.1.1 Geography and flood risk

The Mississippi River drains approximately 41% of the land area of the 48 continental United States, acting as the main drainage channel for an area of more than 1,245,000 square miles. Geographically, the Mississippi River is divided into two broad categories, the Upper and Lower rivers, as divided by the confluence of the Ohio River. The Upper Mississippi River is typically a more 'wild' river than its downstream counterpart, with numerous bends and one natural waterfall. As a result, large scale engineering projects, including locks and dams, dominate the upper portion of the river in order to facilitate river transportation. In contrast, the engineering projects along the relatively more smooth, deep, and stable Lower Mississippi typically revolve around constructing flood prevention levees along the river banks. This lower portion of the Mississippi River in particular is prone to frequent and at times devastating flood events largely due to its geographic position. Ecologically, the lower alluvial valley of the Mississippi River is a fertile area of flood plains that stretch across 35,000 square miles of the states of Missouri, Tennessee, Kentucky, Arkansas, Mississippi and Louisiana (which has almost 5 million inhabitants; greater New Orleans has about 1.5 million).

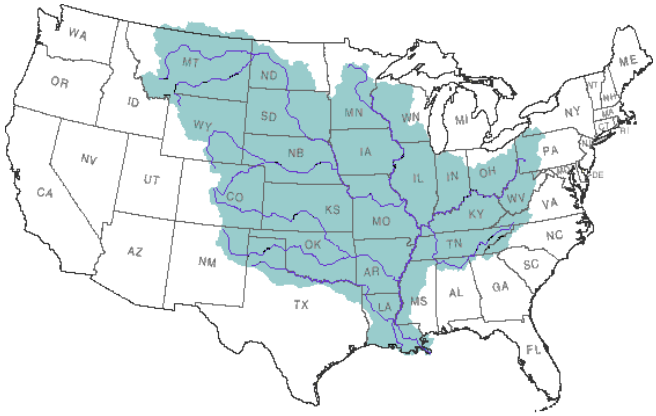


Figure 15: The Mississippi basin (www.nsc.org/EHC/jrn/weather/mississi.htm)

New Orleans is located near the Gulf of Mexico, in the Mississippi delta. Two major sources of flood risk confront the area in and around New Orleans; storm surges and riverine flooding. For the most part, flood defenses built in Louisiana have been designed to prevent river floods, with somewhat less attention paid to storm surges. This is simply the product of frequency—hurricanes strike less frequently than does river swelling. Around the city of New Orleans and within the state of Louisiana broadly, the Mississippi River has been a source of frequent flooding.

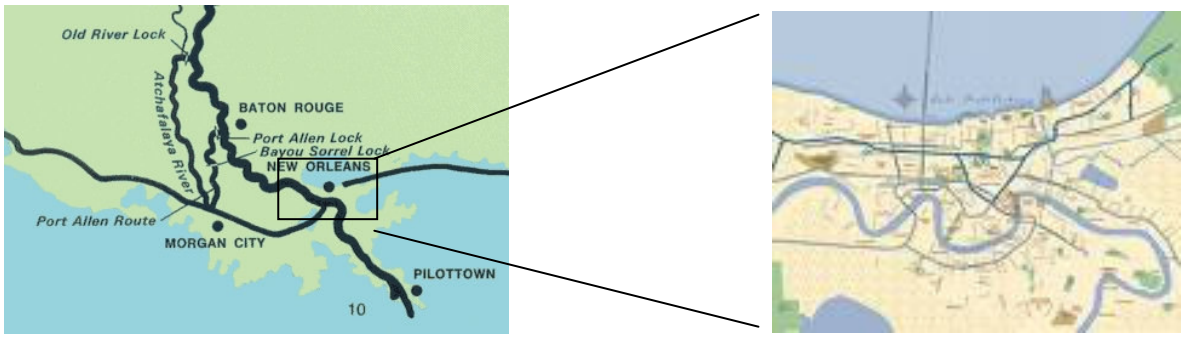


Figure 16: The lower Mississippi basin and New Orleans (http://pesn.com/2005/09/23/9600175../)

During the 19th century, a series of floods along the Mississippi led Congress to create the Mississippi River Commission in 1879. The Commission was charged with overseeing engineering projects along the river, and to create adequate flood defenses to ensure continued commerce. Subsequent floods along the Lower Mississippi in 1882, 1912, 1913 and 1927 pushed flood hazard mitigation onto the national agenda. In particular, the great flood of 1927 was so devastating—over 600,000 persons displaced, nearly $1.5 billion in modern-dollar damages—that Congress passed the first comprehensive policy to deal with flood prevention (Platt 1999). The Flood Control Act of 1928 has since been amended numerous times, but remains the bedrock upon which most subsequent federal policy is based.

Despite recognition of flood risk potential, the lower Mississippi region has experienced several notable major floods over the past half-century. In addition to the well-publicized Hurricane Katrina, other major floods have occurred recently. Since 1990, six Presidential Disaster Declarations have covered flooding in Louisiana alone (FEMA). The frequency of flooding is particularly prevalent in Louisiana. According to statistics from the National Flood Insurance Program, the state of Louisiana leads the nation in number of so-called “repetitive flooding properties”—those properties that have experienced multiple instances of major flood damage—and has nearly double the number of such properties as the second place state.

Beyond simply the frequency of flooding in Louisiana, the City of New Orleans is particularly vulnerable to flood events because of its geographic location wedged along the Mississippi, below Lake Pontchartrain, and around the Gulf of Mexico; and because of its geological location on loose sediment. Much of the city lies below sea level and many areas of the existing city, built on peat, are continually sinking inches per year (US Geologic Survey).

Economic losses from Hurricane Katrina in 2005 are estimated to be more than $200 billion, the largest for any disaster in U.S. history (Burby, 2006, who continues:) “Federal policies have sought to make areas at risk from natural hazards safe places for urban development by reducing the degree of hazard and by shielding hazard-area occupants from financial risks of loss. Over time, these policies have facilitated the development of these areas, as illustrated by urban growth in New Orleans, but they have increased the potential for catastrophic losses in large disasters. In this sense, Hurricane Katrina and the flooding of New Orleans could be viewed as an expected consequence of federal policy rather than an aberration that is unlikely to be repeated.”

Katrina was predicted in a famous article in the Scientific American (2001)
"Since 1879, however, the Corps of Engineers, at Congress's behest, has progressively lined the river with levees to prevent floods from damaging towns and industry. The river is now shackled from northern Louisiana to the gulf, cutting off the sediment supply. As a result, the plain just subsides below the encroaching ocean. As the wetlands vanish, so does New Orleans's protection from the sea. (..) Louisiana's ***barrier islands are eroding*** *faster than any around the country. (..) Stopping the floods and draining surface water lowered the water table, allowing the top mucks (*a kind of peat, SN*) to dry (..),* ***hastening the city's drop below sea level****. As the bowl became deeper, it would flood during routine rainstorms. So the Corps, in cooperation with the city's Sewerage and Water Board, began digging a maze of canals to collect rainwater (…) leading to further drying (..)*

The only realistic solutions, most scientists and engineers agree, are to ***rebuild the vast marshes*** *so they can absorb high waters and reconnect the barrier islands to cut down surges and protect the renewed marshes from the sea. Since the late 1980s Louisiana's senators have made various pleas to Congress to fund massive remedial work. But they were not backed by a unified voice. L.S.U. (*Louisiana State University, SN*) had its surge models, and the Corps had others. Despite agreement on general solutions, competition abounded as to whose specific projects would be most effective. (…) Len Bahr, head of the governor's, Coastal Activities Office in Baton Rouge, tried to bring everyone together. There are* ***five federal agencies and six state agencies*** *with jurisdiction over what happen in the wetlands. (..) The scientists, engineers and politicians who had been squabbling r****ealized how close the entire delta had come to disaster, and Bahr says that it scared them into reaching a consensus****. Late in 1998 the governor's office, the state's Department of Natural Resources, the u.s. Army Corps of Engineers, the Environmental Protection Agency, the Fish and Wildlife Service and all 20 of the state's coastal parishes published Coast 2050-a blueprint for restoring coastal Louisiana. No group is bound by the plan, however, and if all the projects were pursued, the price tag would be $14 billion. (…)*

Bahr would like to integrate science and engineering further by requiring independent scientific review of proposed Corps projects before the state signed on which Louisiana would need to do because Congress would require the state to share the cost of such work. If Congress and President George W. Bush hear a unified call for action, authorizing it would seem prudent. (..) And without action, the million people outside New Orleans would have to relocate. The other million inside the bowl would live at the bottom of a sinking crater, surrounded by ever higher walls, trapped in a terminally ill city dependent on nonstop pumping to keep it alive. (…)

More storms of greater intensity as a result of ***climate change****. (…) When Allison, the first tropical storm of the 2001 hurricane season, dumped five inches of rain a day on New Orleans for a week in June, it nearly maxed out the pumping system. Walter Maestri (Jefferson Parish emergency management director), spent his nights in a flood-proof command bunker built underground to evade storm winds; from there he dispatched police, EMTs, firefighters and National Guardsmen. It was only rain, yet it stressed the response teams (Fischetti, 2001)*

Figure 17: Post Katrina (http://www.ohsep.louisiana.gov/hlsmitigation/hazmitigatpln.htm)

9.1.2 Structure of the government

Generally, the rivers and wetlands are managed by the federal government. According to the Association of State Floodplain Managers (2003), regulating development can best be done by local governments, following the standards and procedures of state enabling authority. Flood insurance is best handled at the federal level because of the need for a large policy base and because of the infrequency of disasters in any one city or state. Coordination and liaison roles, among others, fall naturally upon state-level agencies. Past analyses of the practice of floodplain management in the United States have illustrated that governments, organizations, and individuals often work to utilize whatever measures are necessary and feasible in a given situation to reduce flood losses or preserve resources, whether or not it is regarded as their "proper" role or responsibility. Thus, what is handled by states in one part of the country is handled by localities in another; functions that are separate in one state are intertwined in another; federal criteria sometimes are the maximum achieved and at other times are only stepping stones to more exacting standards.

Federal government
Federally, there are numerous agencies at work - FEMA, Army Corps of Engineers, the Natural Resources Conservation Services (NRCS), etc. FEMA manages the NFIP program and provides primary federal oversight following a disaster; the Army Corps constructs dams, levees, floodwalls, etc., at the discretion of Congressional appropriations (i.e. most, if not all, flood projects are individually mandated by Congress--the Army Corps has very little independent discretion over building projects); the NRCS constructs agricultural levees.

Congress
Congress has decision-making power about the use of the national budget. It is the client of the U.S. Army Corps of Engineers, that implement there plans and programs. (Since the 1980s Louisiana's senators, members of congress, tried to press for more money to flood prevention in Congress).

U.S. Army Corps of Engineers (Holahan, 2006)
One of the earliest federal agencies, the Army Corps of Engineers ("Corps") was established in the early 1800s to manage navigable waterways for commerce. By the mid-1800's, however, this mission expanded to include the construction of flood control projects along the Mississippi River Basin. Today its mission statement is to provide "quality, responsive engineering services to the nation" through the management of

water resources generally. At least on its website, the mission statement of the Corps makes no specific reference to either navigation or flood control priorities.

The construction and maintenance of levees generally falls on one of two federal agencies, the Natural Resources Conservation Service (NRCS) and the Army Corps of Engineers. Formed during the New Deal programs of the 1930s, the Natural Resources Conservation Services was established to coordinate watershed management within the Department of Agriculture. However, in 1954 Congress broadened its mandate to include the construction of flood prevention measures that affect local agricultural watershed districts at the bequest of local governments. Typically these projects are much smaller than the ones undertaken by the Corps and are dominated by the construction of reservoirs and channels, rather than large-scale floodwall construction. Under traditional interpretations, the Army Corps' authority also included wetland regulation because these serve as a vital source of water for rivers and as a regulatory control for water overflows. However, recently there is controversy about its role. Local and state governments may be considered to not only have the constitutional right to regulate land use over wetlands, but that they also have the best ability to regulate such lands. The contra-argument would be the Corps should coordinate wetland management because of the externalities to river systems. Information about the local branch in New Orleans District can be found on http://www.mvn.usace.army.mil/ .

Federal Emergency Management Agency (FEMA) and National Flood Insurance Program (NFIP)
On March 1, 2003, the Federal Emergency Management Agency (FEMA) became part of the U.S. Department of Homeland Security (DHS). The primary mission of the Federal Emergency Management Agency is to reduce the loss of life and property and protect the Nation from all hazards, including natural disasters, acts of terrorism, and other man-made disasters, by leading and supporting the Nation in a risk-based, comprehensive emergency management system of preparedness, protection, response, recovery, and mitigation.

The U.S. Congress established the National Flood Insurance Program (NFIP) with the passage of the National Flood Insurance Act of 1968. The NFIP is a federal program enabling property owners in participating communities to purchase insurance as protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages.

FEMA's Mitigation Directorate manages the National Flood Insurance Program (NFIP) and a range of programs designed to reduce future losses to homes, businesses, schools, public buildings and critical facilities from floods, earthquakes, tornadoes and other natural disasters. Mitigation focuses on breaking the cycle of disaster damage, reconstruction, and repeated damage. Mitigation efforts provide value to the American people by creating safer communities and reducing loss of life and property (From: http://www.fema.gov/hazard/flood/fl_before.shtm).

Mitigation includes such activities as:

- Complying with or exceeding NFIP floodplain management regulations.
- Enforcing stringent building codes, flood-proofing requirements, seismic design standards and wind-bracing requirements for new construction or repairing existing buildings.
- Adopting zoning ordinances that steer development away from areas subject to flooding, storm surge or coastal erosion.
- Acquiring damaged homes or businesses in flood-prone areas, relocating the structures, and returning the property to open space, wetlands or recreational uses.

To prepare for a flood, you should:

- Avoid building in a floodplain unless you elevate and reinforce your home.
- Elevate the furnace, water heater, and electric panel if susceptible to flooding.
- Install "check valves" in sewer traps to prevent flood water from backing up into the drains of your home.
- Construct barriers (levees, beams, floodwalls) to stop floodwater from entering the building.
- Seal walls in basements with waterproofing compounds to avoid seepage.

The Environmental Protection Agency (Holahan 2006)

The EPA has responsibilities with regard to water pollution and nature conservation. The link with flood management is indirect, but institutionally it is interesting because an example of a modest coordinated approach to water management can be found in the National Estuary Program (NEP) created by the 1987 amendments to the Clean Water Act. The goal of NEP was to supplement local and federal control over water quality in coastal estuaries through vertical and horizontal linkages amongst various stakeholders. Because estuaries often cross existing geopolitical boundaries, it was difficult to reduce pollutant discharges into these water systems without some external coordination. Rather than a simple top-down managerial approach, however, Congress authorized the Environmental Protection Agency to create policy boards that oversee the entirety of an estuary. The strength of the program may lie in its ability to give different stakeholders a policy instrument to voice opinions, while also giving legitimacy to the policy decisions because all of the stakeholders are given consultation rights. This may have created a network of property owners, business owners, local governments, politicians, scientific experts, and bureaucrats that coordinates information sharing. This may have reduced the costs of collective action and helped to improve water quality where the program has been implemented.

State level

State governments derive their authority to plan and implement floodplain management actions from the police power that is vested in them by the U.S. Constitution. States have a responsibility to do floodplain management—floods are inevitable; damage will occur; and there will be adverse impacts on the citizens and disaster costs in that state. The principal roles played by states in floodplain management today include planning and implementing programs and projects for managing their own floodplains, including state-level regulations; providing technical expertise of all kinds to individuals and to other levels of government, especially localities; coordinating local, state, regional, and federal programs within their jurisdictions; coordinating the National Flood Insurance Program (NFIP) activities within their jurisdictions; entering into agreements with other states to cope with multi-jurisdictional flood problems; and acting as liaisons with the federal government (ASFPM 2003).

Louisiana is a "special" state in the US – the only predominately French-tradition state. So, property laws are a bit different there (operating under a French property law system) than in the rest of the US.

The Department of Transportation and Development (DOTD)
DOTD oversees state implementation of the federal "National Flood Insurance Program" (NFIP). NFIP requires communities to implement base levels of mitigation strategies in order to be elegible for federally-backed flood insurance. In theory, communities are only eligible for federal assistance following a flood if they are a part of NFIP, but in reality Congress often bails communities out. So, the DOTD oversees that program and develops floodplain management.

The Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP)
Formally the Louisiana Office of Homeland Security and Emergency Preparedness (LOHSEP), was created by the Civil Act of 1950. In March of 2006 the Agency came under the Governor's Office. It is responsible for implementing the national eligibility requirements for flood insurance, supervised by FEMA. To that end it regularly must produce a plan, of which the last version dates February 2008.

GOHSEP have the primary responsibility for developing and maintaining a 3-year master Hazard Mitigation Plan, which is required for federal matching funds. This master plan incorporates all disaster risks, but it's estimated that 75% of disaster damages in LA are flood-related. This agency also manages a disaster area after it occurs, whereas it seems that the DOTD does more of the zoning decisions (Holahan, 2006).

Burby (2006): “Using data on National Flood Insurance Program (NFIP) claims and payments in coastal counties over a twenty-five-year period, (..) comprehensive planning requirements adopted by state governments already have resulted in lower per capita losses from flooding. But less than half of the states require local governments to prepare plans, and fewer than ten states require that plans pay attention to natural hazards.” Louisiana however, is not among those states. The state can influence flood risk, as Burby (2006) shows. The number of NFIP insurance claims per capita for compensation of flood damages and the per capita dollar amount of payments made to settle claims are highest in states that do not require responsible behavior—neither building code enforcement nor comprehensive plans—from their local governments. The three states hardest hit by Hurricane Katrina left decisions about code enforcement and planning for urban development and redevelopment wholly to local discretion.

STATE REQUIREMENTS FOR LOCAL GOVERNMENT BUILDING CODE ENFORCEMENT AND COMPREHENSIVE PLANS IN ATLANTIC, GULF, AND PACIFIC STATES

State Requirements for Local Government Building Code Enforcement and Comprehensive Plans	States (Number of Coastal Counties/Parishes)
No state local government building code enforcement or comprehensive plan requirements	6 states with 58 counties: Alabama (2), Louisiana (25), Mississippi (3), New Hampshire (2), Pennsylvania (3), Texas (23)
State local government building code enforcement requirement but not comprehensive plan requirement	3 states with 37 counties: Connecticut (4), New Jersey (17), New York (16)
State local government comprehensive plan requirement but not building code requirement	5 states with 33 counties: Delaware (3), Georgia (6), Hawaii (5), Maine (10), South Carolina (9)
Both state local government building code and comprehensive plan requirements	10 states with 236 counties: Alaska (19), California (22), Florida (67), Maryland (17), Massachusetts (9) (plan requirement for larger cities and towns), North Carolina (20), Oregon (13), Rhode Island (5), Virginia (46),[b] Washington (17) (plan requirement for high growth counties only)

SOURCE: Schwab (2002).
a. Local governments in seven of these ten states (California, Florida, Maine, Maryland, North Carolina, Oregon, South Carolina) are also required to include a hazards element in the comprehensive plan.
b. Includes independent cities as well as counties.

Figure 18. From Burby (2006)

Some data about the Louisiana Hazard Mitigation Master Plan
It is plan to reduce a community's risk and exposure to disasters (not Emergency Operations Plan, which is a plan to guide a community's response to an emergency or disaster). The Plan satisfies requirements of the Disaster Mitigation Act of 2000 (DMA 2000), keeping Louisiana eligible for millions of dollars of pre- and post-disaster grants (the plan was developed according to FEMA recommended process)

Hazard mitigation measures can include structural projects like levees, dams, or building safe rooms, non-structural projects like acquisition, elevation, retrofit of buildings, or vegetation management, regulatory practices like enacting or enforcing building codes, permits, or land use policies, training and educational programs for communities and State agencies.

In the last 10 years, there have been 16 Presidential Disaster Declarations for natural hazards in Louisiana. The total federal assistance paid for these disasters is over $26 billion. The actual damages far outstrip federal assistance – the costs of Katrina and Rita alone are estimated between $90 and $140 billion. And then there is the human cost – nearly 1500 deaths, and nearly 200,000 people still displaced. 75% of Louisiana's natural disaster declarations in the past decade involved flooding.

Between 1995-2004, Louisiana received more than $40 million from the Hazard Mitigation Grant Program (HMGP); it received nearly $170M in HMGP after Katrina and Rita. The State is also competitive for Pre-Disaster Mitigation (PDM) and Flood Mitigation Assistance (FMA) grants, winning nearly $8 million since 1998. Statewide Hazard Mitigation Community Education and Outreach Project: a Hazard Mitigation Grant Program-funded, multi-faceted, three-year initiative to establish a culture of mitigation throughout Louisiana (http://www.ohsep.louisiana.gov/hlsmitigation/hazmitigatpln.htm)

Louisiana Governor's, Coastal Activities Office (http://www.goca.state.la.us/)
Coastal wetlands are important as buffer against floods (see the box about the article in the scientific American, 2001). The Governor's Office of Coastal Activities and the State Wetlands Authority were created by Act 6 during the second extra-ordinary session of 1989 for the conservation and restoration of Louisiana's coastal wetlands. The devastating effects of the hurricanes of 2005 prompted the State Legislature to enact Act 8 of the special session, replacing the State Wetlands Authority with the Coastal Protection and Restoration Authority and bringing the missions of coastal infrastructure protection and wetlands restoration under the control of one entity for the first time in Louisiana's history. The mission of the Governor's Office of Coastal Activities is to provide leadership and support to the CPRA and to direct and coordinate the development and implementation of policies, plans and programs which encourage multiple uses of the coastal zone and achieve a proper balance between development and conservation, restoration, creation and nourishment of coastal resources.

Since 1930, Louisiana has lost over 1,500 square miles of marsh. The state is still losing 25 to 30 square miles each year, nearly a football field of prime wetlands every 30 minutes. Louisiana state government has joined forces with federal and local agencies and non-governmental organizations to slow this loss. This page contains information on the major projects and activities approved by the Coastal Wetlands Planning, Protection and Restoration Act ("Breaux Act") and co-sponsored by the State of Louisiana.

The Coastal Wetlands Planning, Protection & Restoration Act (CWPPRA hereafter the Breaux Act PL 101-646, Title III) was signed into law in 1990.The Breaux Act established a Task Force consisting of the U.S. Departments of Agriculture (Natural Resource Conservation Service), Interior (Fish and Wildlife Service),

Commerce (National Oceanic and Atmospheric Administration), the Environmental Protection Agency, the Army Corps of Engineers, and the Governor of Louisiana.

Flood Districts
Like many states, also Louisiana has flood districts. The Orleans Parish Levee Board was disbanded in 2006 in favor of a more regional district commission. It's now called the Southeast Louisiana Flood Protection Authority (http://www.slfpae.com/).

The State and the County or Parish in USA flood plain management (ASFPM, 2003)

States
Most states do more than just Community Assistance Visits and National Flood Insurance Program coordination. Communities are moving beyond simply administering floodplain management regulations and managing floodplains based on principles of sustainability and multi-objective management.

States play a vital role in reducing flood losses by providing direct technical assistance to local governments; enforcing regulatory requirements; training local floodplain managers, insurance agents, engineers, surveyors, and others; managing or assisting with hazard mitigation activities; mapping flood hazards; managing protection and restoration projects and programs for floodplain resources and functions; and fostering state and regional floodplain management organizations.
States strive for a certain level of contact with each floodprone community within their jurisdictions, on a regular basis, as much as possible. Louisiana visits communities with new local floodplain administrators first;

Some states directly regulate certain aspects of land use, selected types of lands, and specific kinds of activities. This is done for a variety of reasons: perhaps the state has much more technical expertise on staff and thus can better evaluate certain kinds of development; perhaps circumstances dictate that a broader approach be used than that possible at the local level; and in some cases states regulate directly to compensate for the inability or unwillingness of local governments to take steps to reduce their flood risk or preserve the natural functions of their floodplains. Some states emphasize public outreach and direct technical assistance to local governments. Others focus on enforcement. Still others focus on training local partners through state offices and state and regional floodplain management organizations. The many activities and programs that contribute to floodplain management—emergency preparedness and response, natural resources protection, environmental quality, structural control measures, planning, economic development, etc.—along with the wide variety in local and regional efforts, makes the floodplain management picture of each state unique.

Local government is the foundation of comprehensive floodplain management because localities usually plan for, determine, and supervise the use of land within their jurisdictions (under the authority of the police power delegated by the state) and because the impetus for obtaining financial and technical assistance from the state and federal levels originates with the local community. The willingness and ability to take steps to manage floodplains and reduce flood losses are not automatic on the part of local governments, however. Localities are limited by their legal authority, by financial considerations, by the amount of technical expertise available to them, and by the fact that flooding and natural resource depletion must take their places among numerous other local concerns. Local floodplain management programs vary according to the size of the community; the policy, political structure, and economic status of the state in which the locality lies, the type of flooding it faces; and the amount of development pressure existing in the community as a whole and in its floodprone areas. Typical small communities have no floodplain management program per se, and may have only one official, usually a floodplain administrator or building inspector, who monitors and enforces compliance with the local flood hazard reduction ordinance along with other unrelated duties. In general, the larger the community, the more sophisticated and comprehensive the floodplain management related technical expertise available to it, including planning, engineering, additional inspection and enforcement capabilities, emergency management, maintenance, parks and recreation support, water treatment facilities, and the like.

Counties or Parishes

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In addition to the community officials and staff, there is a range of sub-state entities that also contribute to floodplain management. These vary from state to state, but can include regional water districts, flood control districts, levee boards, watershed conservancy districts, planning commissions, natural resources districts, river authorities, county conservation districts, councils of government, stormwater management authorities, and others. Floodplain management personnel from these entities and from the localities themselves account for an estimated 50,000 people working on flood-related issues at the sub-state level throughout the country. All national programs need to recognize that this large group needs to be reached with awareness efforts and information and training in program goals, details, technical matters, procedures, and policy— and that such outreach must be ongoing because of staff growth and turnover.

Counties and Parishes

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The New Orleans metropolitan area's two largest parishes are Jefferson and Orleans. Over the twenty-three year period between 1978 and 2000, the two parishes were exposed to nineteen damaging flood events and eighteen hurricane events, almost one per year.

Cooperation with regard to floodplain management (Holohan, 2006)

At least two pieces of federal legislation mandate local and federal cooperation in flood control projects, the Water Resources Development Act (WRDA) and the National Flood Insurance Program (NFIP). Beginning in 1986, the WRDA introduced local cost-sharing arrangements between federal and local agencies in the planning and constructing flood prevention measures. The purpose of this shift in cost arrangements was presumably to make Corps projects more relevant to local needs and by making local governments share in the cost, to make these projects more cost effective. Since a local government's budget can be more easily scrutinized by stakeholders, the idea was that projects would be undertaken with cost-efficiency in mind. As a result, however, local politicians and regional members of Congress became more involved in project planning, coordination, and construction. This has led to a decrease in vertical project linkages and an increase in site-specific construction.

To guard the federal government against the constant constituent pressures to bailout property owners and to reduce development in flood prone areas, Congress passed the National Flood Insurance Program (NFIP) in 1968. During the 1960s, economists began to argue that one potential method to reduce construction in floodplains was to raise the costs of construction in these zones and to require the purchase of insurance premiums. Administered by the Federal Emergency Management Agency (FEMA), the NFIP guarantees communities federal insurance against flooding, provided that the local community implements strategic plans for floodplain development and flood reduction. This primarily includes implementing construction requirements that buildings be raised to above the 100-year flood level, or at times the clearing of a floodplain to prevent development. Often this works in conjunction with the construction of flood works such as levees. Insurance rates are based on readily available Federal Insurance Rate Maps that differentiate levels of risk based on analyses of elevation and proximity to water sources. Since 1973, most property owners located within a floodplain at high risk of flooding are required to purchase insurance if they want a federally backed mortgage loan. A cursory glance at the community membership in NFIP shows that while the vast majority of communities qualify, individual property owners who are not required to own insurance often decline to enroll. Coordination might be in the form of collaborative ventures by diverse stakeholders, or possibly through bureaucratic management by a federal agency like the Army Corps of Engineers (Corps). Indeed, many within the Corps recognize the potential benefits from a more hands-on coordination role, but complain that current federal regulations tie their hands by focusing projects entirely on the needs of specific localities (NRC 2004: 3-4). This structure has evolved over the past several decades to focus Corps projects on local desires in an attempt to make the federal government more responsive to the needs of individual communities. Though this approach has succeeded in reducing Corps expenditures on specific projects and has probably made the Corps more

responsive to local needs, it has created a patchwork of localized projects uninhibited by vertical coordination.

9.2 Description of the Flood risk management system and chosen strategies on operational level

9.2.1 Pro-action

Making spatial plans conscious of risk

Pro-action is defined as to apply measures that prevent flood risk to emerge, for example, by not building on vulnerable locations, or building upstream water retention capacity. The City of New Orleans did not update its 1970 comprehensive plan for almost thirty years. When it got around to this in 1999, its New Century New Orleans Land Use Plan made no mention of the extreme flood hazard facing the city, ways of mitigating the hazard through land use or building regulations, or how the city might recover from an event such as Hurricane Katrina (Burby, 2006).

According to Burby (2006), avoidance of losses is not a priority for local officials, which most clearly results in a lack of pro-action. Prior to being coerced into adopting floodplain management regulations by the National Flood Insurance Act in 1968, virtually no local governments in the United States had adopted building or zoning regulations to minimize flood losses. Although thousands of governments subsequently adopted the minimum building standards needed to participate, many did not enforce them seriously or take other actions to deal with flood and hurricane risks.

Congress in 1968 passed the **National Flood Insurance Act** to enable households and businesses to insure their property from flood damages, which most commercial insurance companies refused to cover in standard property insurance policies. In return, it influenced local development, Burby (2006) indicates that according to some scholars federal rules it encouraged the intensive use of areas exposed to natural hazards. Levees subsidized by the federation (described hereafter under Prevention) encouraged development of sensitive area. However, even without such “perverse” effect, national insurance may cause a complacency of local authorities with regard to the impact of their decisions on risk for their citizens. This may create a “moral hazard” that discourages local governments (and individuals) from taking actions to reduce the risk of loss. (Burby himself, however, contends that there is no empirical evidence of this effect.)

By the 1990s, various federal programs were being adjusted to deal with the moral hazard issue (Burby, 2006):

- The Stafford Act in 1988 and more recent Disaster Mitigation Act of 2000 both provide federal assistance for the preparation of **state and local hazard mitigation plans** and implementation of hazard mitigation projects. Although the Stafford Act has been found to be ineffective in many cases, some of the problems identified may be countered by the more recent Disaster Mitigation Act of 2000 legislation.
- The Flood Insurance Reform Act of 1994 established incentives for the preparation of floodplain management plans and other flood mitigation measures
- The Flood Insurance Reform Act of 2004 provided tools for dealing with repeatedly flooded properties. However, the degree to which any of these efforts have had an effect on local government commitment to dealing with hazards is not known at this time.

"Moral hazards": federal insurance may stimulate carelessness (Burby, 2006)
Moral hazard is an insurance term that refers to cases where the availability of insurance protection lowers an insured party's incentive to avoid risk. Insurance companies try to counter this through the use of deductibles, higher insurance rates, and the threat of canceling policies if claims are too frequent. The potential for moral hazard in the federal approach to natural hazards was first noted by the Interagency Floodplain Management Review Committee (1994) following disastrous floods in the upper Midwest in 1993. In commenting on the potential for federal programs to create a form of moral hazard, the committee observed, "Through provision of disaster assistance and, in some cases, enhanced flood protection, the government may in fact be reducing incentives for local governments and individuals to be more prudent in their actions."

Also written in 1994, the House Bipartisan Natural Disasters Task Force stated, "If state and local governments believe that the federal government will meet their needs in every disaster, they have less incentive to spend scarce state and local resources on disaster preparedness, mitigation, response and recovery . . . (and) people are encouraged to take risks they think they will not have to pay for" (quoted in Platt 1999, 39). Finally, scholars have argued that a "scattershot approach, as well as the federal and state trend to cut risk and assume liability, has undermined the responsibility of local governments for using land-use management techniques to reduce exposures to hazards.

Louisiana's Comprehensive Master Plan for a Sustainable Coast (2007)
Louisiana refocused its method of handling these matters when the state legislature passed Act 8 in November 2005. Signed into law by Governor Blanco in November 2005, the act created the Coastal Protection and Restoration Authority (CPR Authority) and charged it with integrating coastal protection and restoration in order to create a comprehensive solution to the challenges facing south Louisiana. To support this mission, Act 8 gave the CP Authority oversight of state entities such as levee districts, as well as other tools for coordinating the work of multiple agencies. The state's Master Plan for a Sustainable Coast was also created in response to the mandates of Act 8. The act stipulated that the Master Plan integrate both hurricane protection and coastal restoration measures in order to ensure the long-term health of the entire region.

This plan, adopted by the state in 2007, indicates the Master Plan for a Sustainable Coast in 2007. The Master Plan presents a detailed vision of how a restored and protected coast could be achieved. The 2007 report of the Louisiana Governor's Advisory Commission on Coastal Protection, Restoration, and Conservation indicates that that coastal wetland restoration and flood protection go hand in hand. **The 2007 report indicates the number 1 challenge that must be addressed as Louisiana implements its coastal protection and restoration program is to improve coordination with federal agencies and pursue a more robust partnership with the Corps. Its nature as a lobbying report for attention by the federal government is underlined by the following text box:**

Louisiana is home to nationally significant infrastructure worth hundreds of billions of dollars.

Two themes dominate the plan's discussions of options. The first stresses the need to continually update the state's vision as new knowledge is gained. Called "adaptive management," this approach can uphold the program's basic objectives over the coming years while also responding to lessons learned and changing conditions. The Master Plan's second theme concerns the hard choices that must be made given the scarcity of time and resources that are available to complete this massive undertaking. The plan states that "we cannot save every coastal feature, nor can we extend the same level of hurricane protection to every south Louisiana community. Areas with fewer assets and lower populations will have to live with more flood risk than will major cities."

Making Room for Water
The Mississippi River is a major transportation river—something like 80%+ of US agricultural exports travel down the Mississippi. The original mission of the Army Corps was to maintain navigable water depth for shipping. Transportation remains probably the most important goal of the river management.

The case of St Louis, where the FEMA has bought out property (Pinker, 2005)
In the case of St Louis, the FEMA has bought out property in a floodplain. Here, the Missouri joins the Mississippi. 7700 properties were acquired at a cost of $56.3 million. Unfortunately, these buyouts are now being massively counterbalanced by new construction on the floodplains, showing where the federal level creates , the local level has the possibility to take it back. Floodplain development projects in the United States are constrained by FEMA guidelines under the National Flood Insurance Program (NFIP), by wetlands protections specified in the Clean Water Act and administered by the Corps of Engineers, and in some locations by more stringent state and local regulations. The NFIP guidelines limit development in the central portion of the floodplain (the "floodway"), but allow virtually unlimited development across the rest of the floodplain so long as developed areas are either raised above the level of the 100-year flood (the event with a 1% chance of occurring in any year) or protected by levees with at least 100-year protection. The federal government in practice has little control. Among the broadest criticisms of flood control by levees is that development in levee-enclosed areas promotes the false expectation that flood risk is reduced to zero. As a National Academy of Science panel concluded, "it is short-sighted and foolish to regard even the most reliable levee system as fail-safe". Currently, FEMA removes areas protected by 100-year levees entirely from their flood-hazard maps. Proposals to elevate or protect areas of the floodplain by levees typically must also obtain wetland fill permits from the Army Corps of Engineers under Section 404 of the Clean Water Act. Such permit requests must demonstrate that the project will not unduly impact the "public interest," including adversely affecting flood hazard. In the St. Louis region, requests for wetland fill permits have been granted despite a long history of research documenting adverse effects of levees, including that they have contributed to increased flood levels.

Part of the failure to recognize flood magnification owing to levees is because incremental levee expansion projects are evaluated individually, even when many projects are proposed for a given river reach. The explosion of floodplain development around the city of St. Louis and other areas of Missouri appears to be linked to state-level floodplain laws that are among the weakest in the United States. Thanks to Federal guidelines, buyouts, and enlightened management in many localities, successes in managing U.S. floodplains outnumber the failures. The problem is that when these measures succumb to local economic self-interest and political pressure, small local failures--like cracks in levees themselves--allow massive increases in floodplain infrastructure that can rob the nation of all the net improvements painstakingly won elsewhere. In spite of the lessons learned during the 1993 flood, the St. Louis region and selected other localities across the United States are seeing their floodplains disappear behind new and enlarged levees and under new urban and suburban development.

9.2.2 Prevention

Prevention is defined as measures close to, or in, vulnerable areas. Dikes (levees) are examples, just as robust building. Flood hazard mitigation policy in the lower Mississippi region typically focuses on preventing river flooding through a complex network of dikes and levees. Burby (2006): “Federal financial support is given to flood and hurricane protection works and beach nourishment, federal requirements are set for through the National Flood Insurance Program NFIP for safe building practices such as elevation of construction in flood hazard areas, and federal incentives for local government mitigation efforts through

provisions of the Disaster Mitigation Act of 2000 and National Flood Insurance Reform Acts of 1994 and 2004."

The mechanism of levee development (Holohan, 2006)
Along with the Natural Resources Conservation Services, the Corps is constrained by its statutory obligations. In order to finance a project or to initiate a project, the 1986 and all subsequent Water Resources Development Acts (WRDAs) require the Corps (or NRCS) to first find a local sponsor. Furthermore, the NFIP requires communities seeking federal flood insurance to devise local flood control projects. The intersection of these two pieces of legislation clearly lies in narrowly conceived projects aimed to protect one town or watershed district without regard for upstream or downstream consequences. This situation is only further hampered by the existence of numerous nonfederal flood projects.

Each state has independent regulations on where, how high, and with which materials local levees can be built. Not only do communities build such 'nonfederal' levees, but so too do individual property owners. Though some of these nonfederal levees are regulated by federal statutes in relation to the NFIP, many others are not. One important difference between federal and nonfederal levees is that the former are generally built to withstand up to the level of a 100-year flood whereas the latter are only built for 5-year floods. Severe flooding that has a 1% chance of occurring in any given year is a 100-year flood and flooding with a 20% chance of occurring in any given year is a 5-year flood. The combination of these different engineering specifications and policies creates a patchwork of unregulated water flow blocking which further hampers the efforts of a coordinated approach to river system flood control management.

The National Flood Insurance Program (NFIP)
The NFIP has been established following the National Flood Insurance Act, revised in 1994 and 2004). It gave Congress power to finance safety projects and require contributions from local actors. The NFIP tries to limit flood losses by imposing construction standards that reduce the likelihood of newly constructed buildings being flooded. These standards, which must be adopted and enforced by local governments as a condition for participation in the program, include elevation or flood proofing to the level of floods with a one in one hundred chance of occurring in any given year. For a variety of reasons, that level of protection is not achieved in some cases and even when achieved may not be adequate. For one, accurate estimation of flood risk is a critical ingredient in regulating the elevation of new development, but the program has had difficulty doing that because it has been unable to update in a timely manner flood insurance rate maps to take into account increased flood risk from sea-level rise, subsidence, coastal erosion, or increased runoff as watersheds develop in urban areas. Flood insurance is available, but buildings are not required to be elevated in areas at risk from dam and levee failure, in areas with localized storm water drainage flooding, or in small watersheds of less than one square mile.

NFIP's flood control and hurricane protection measures have serious limitations, most of which are not recognized by households and businesses who put themselves at risk by locating in potentially hazardous areas (Burby, 2006). These limitations include:

- design limits that can lead to levees being overtopped by flood and hurricane events that are larger than they were designed for
- design flaws and construction and maintenance shortcomings that lead to protective works being breached when they cannot stand up to the forces exerted by large flood and hurricane events.

Both apparently contributed to the levee failures along three New Orleans canals that flooded the city. In 1987 that levee overtopping or failure was involved in approximately one-third of all flood disasters). There is a positive correlation between the degree to which communities used flood control works to limit their

vulnerability to flooding and the amount of new development taking place in their flood hazard areas after the flood control works were completed (Burby, 2006).

The safety levels required and achieved under NFIP
To the degree the program fails to adequately reflect risk in rates and operates at a loss, it subsidizes the occupancy of hazardous areas and facilitates more development than is economically rational. Furthermore, the basic standard of protection used by the NFIP – the onehundred- year flood event – may be ill-advised since most flood losses in the United States stem from less frequent flood events (Burby, 2006).

In recognition of the limitation of the one-hundred-year flood standard, the Association of State Floodplain Managers (2000) recommends that the five-hundred-year flood be used in regulating the elevation of new urban development. In addition to limitations in its ability to limit losses to new development, by subsidizing rates for existing development, the program provides little incentive for property owners to take steps on their own to reduce flood vulnerability. Household surveys found that less than 15 percent of property owners took action to improve their buildings prior to experiencing flood losses. There are a variety of reasons, in addition to subsidized flood insurance, for this inaction, including misperception and underestimation of the risk of flooding, inability to recover investments in mitigation investments through higher resale values, and budget constraints. Repetitively flooded properties (which account for about 2 percent of all NFIP policies) account for more than 25 percent of claims payments made.

Louisiana's Comprehensive Master Plan for a Sustainable Coast (2007)
This plan indicates "Levees are not the answer for every south Louisiana community. Since there are not enough federal dollars or available land to build levees everywhere flooding occurs, the Master Plan highlights ways in which citizens themselves can reduce their risks. The plan recommends that citizens take advantage of the Community Rating System, which can help homeowners reduce their insurance premiums if they raise or retrofit their homes. Making sure their communities curtail development in wetlands and flood prone regions is another measure that can lower flood risks as well as premiums. The plan's emphasis on non-structural solutions highlights the role citizens of the coast can play in making south Louisiana a safe place to live and work. The commission endorses this view and would encourage citizens not just to consider these and similar measures, but to become active participants in the creation of future iterations of the Master Plan."

The Corps makes its own plan
In 2005, after Hurricanes Katrina and Rita, Congress directed the Corps to prepare its own plan for protecting and restoring Louisiana's coast. Called the Louisiana Coastal Protection and Restoration Plan (LA CPR Plan), the Corps's document is due for publication in December 2007. The Corps has said that it will use the state's Master Plan as the springboard for its own deliberations. Doing so is the only sound course of action, given that the Corps and the state must approach Congress and national policy makers in a coordinated fashion. The commission and other state stakeholders hope to evaluate future drafts of the LA CPR Plan to make sure that they reflect the spirit and letter of the Master Plan. According to its website (http://lacpr.usace.army.mil/default.aspx), in March 2008 this plan had not yet been finalized.

9.2.3 Preparation, evacuation / Crisis management and after care: essential strategies

Post-Katrina, aware of flood risk, a lot of attention and professionalism is given to evacuation and other emergency plans. It seems like 90% of the discussion after Katrina has concerned ex post emergency plans. That seems to draws the attention of media and why Katrina was such a national disgrace. Obviously scholars and professionals involved in flood control policies have focused on ex ante prevention, but politicians seem focused on clean up rather than prevention. To minimize the adverse financial consequences for individuals and businesses when steps to make development safe from hazards fail (known technically as residual risk), the federal government has provided generous disaster relief, particularly for homeowners; low-cost loans to ease business recovery; income tax deductions for uninsured disaster losses; and subsidized flood insurance (Burby, 2006). Yet, Burby (2006) also indicates that a relatively small proportion of damage from USA's natural disasters ($500 billion in the United States between 1975 and 1994) is covered by federal disaster relief and that most losses were not insured and borne by local residents and businesses.

Pets
Interestingly, perhaps the only major piece of federal legislation to happen after Katrina is called 'PETS' (Pet Evacuation and Transportation Standards Act), which passed unanimously in the House of Representatives. Basically the law requires all communities that want to qualify for federal assistance during a disaster to have as a part of their disaster management plan a section that accounts for personal pets. Communities don't have to allow people to bring their dogs on evacuation busses, for example, but they do have to provide a safe location for pets to be dropped off at when an evacuation happens. One of the major controversies after Katrina concerned all the dogs and cats left behind; there have been numerous lawsuits concerning ownership of abandoned pets, etc.

9.3 Description of the governance system of spatial / defense investments and spatial restrictions

9.3.1 Who is funding which costs?

Flood defenses are typically financed either locally or federally. Individual property owners often build personal levees (particularly in agricultural areas) and some river-towns have community-built levees. Most projects seem to be joint local-federal projects; the resources and engineering expertise of the Army Corps is probably more than any individual community has.

Pre Katrina
Funding of defenses

- Burby (2006): the Orleans Parish Levee Board's unwillingness to help underwrite the costs of higher levels of flood and hurricane protection. So, there was no matching from the federal level either.
- Hazard Mitigation Grant Program (Between 1995-2004, Louisiana received more than $40 million from the Hazard Mitigation Grant Program (HMGP); it received nearly $170M in HMGP after Katrina and Rita. The State is also competitive for Pre-Disaster Mitigation (PDM) and Flood Mitigation Assistance (FMA) grants, winning nearly $8 million since 1998) (http://www.ohsep.louisiana.gov/hlsmitigation/hazmitigatpln.htm)

Federal funding of state agencies

- The Community Assistance Program-State Support Services Element (known as CAP) is a cooperative agreement between FEMA and the states, supported by NFIP funds. Through CAP, FEMA provides funding to the appropriately designated state agencies charged with NFIP oversight. These agencies (designated by individual governors) receive a 75% federal-25% state cost-shared fund to help communities within that state achieve and maintain compliance with the NFIP.
- The budget of Louisiana for state agencies aimed at floodplain management is indicated in Appendix A.

Damage compensation

- The NFIP has regularly not been able to cover its costs from premiums and has had to borrow from the Treasury. According to Pasterick (1998), operating losses occurred annually between 1972 and 1980 and in the years 1983, 1984, 1989, 1990, 1992, 1993, 1995, and 1996. An operating loss also occurred in 2004, and with more than $22 billion in expected claims from Hurricanes Katrina, Rita, and Wilma in 2005, the program will require an infusion of money from the Treasury that it will not be able to repay from future premium income (Crenshaw 2005, A8).

Changes Post Katrina

Federal funding of defenses

- Congress Coastal Impact Assistance Program (CIAP): $523 million through 2010 for coastal restoration and infrastructure projects that address the effects of offshore oil and gas activities in Louisiana's coastal parishes (Governor's Commission 2007)
- Congress approved in 2006 an offshore revenue agreement that will give Louisiana approximately $20 million per year until 2016. After that date, Louisiana will receive between $300 and $500 million or more per year. This funding level recognizes that Louisiana supplies one-third of the nation's oil and gas. In addition, the presence of oil and gas infrastructure within the wetlands has been one of the major factors in the ecosystem's deterioration, even as the wetlands themselves protect this infrastructure from storm surge and open water conditions (Governor's Commission 2007). To ensure that this money is properly allocated, Louisiana voters overwhelmingly approved a constitutional amendment in the fall of 2006 that will place all offshore revenue not already earmarked by Congress in a "lockbox" reserved exclusively for coastal restoration and protection. The voters have thus enforced the spirit of the Congressional legislation: the allocation to Louisiana was made in recognition of the service and needs of our coast, and those dollars must go toward protecting communities and returning this landscape to health.
- The same rationale spurred the passage (by Louisiana voters) of the Coastal Impact Assistance Program (CIAP), which Congress approved in 2005. The CIAP program will provide approximately $523 million through 2010 for coastal restoration and infrastructure projects that address the effects of offshore oil and gas activities in Louisiana's coastal parishes. The first listing of CIAP funded projects was released in early June 2006. Overall, the projects are designed to mesh with existing efforts and to start up quickly, with construction of some projects beginning in 2009. The commission supports the program's current focus on coastal restoration, a focus that galvanized support among members of Congress and citizens.

State funding of defenses

- Not allocated yet: match requirement (for every federal contribution through the Water Resources Development Act or similar program, Louisiana must be prepared to supply a match of at least 25%. To meet the match requirement, Louisiana will need to dedicate hundreds of millions of dollars a year exclusively to coastal) (Louisiana's Comprehensive Master Plan for a Sustainable Coast 2007)

Together, the offshore revenue allocation and the CIAP funds will be invaluable financial tools as Louisiana implements its coastal protection and restoration program. However, these sources of revenue will not be enough to finish the job. Saving Louisiana's coast will be a civil works project on the scale of the construction of the Interstate Highway System. As such, this effort will need a great deal more federal funding if it is to succeed. Progress must thus be made on two fronts: increase the national commitment to the same coast that delivers billions of dollars each year in value to the U.S. economy, and significantly upgrade the state's own long-term funding allocations to coastal restoration (Louisiana's Comprehensive Master Plan for a Sustainable Coast 2007).

Local funding

- Pre-Katrina it was very limited (Burby 2006); post Katrina it is unknown.

Damage compensation

- In the last 10 years, there have been 16 Presidential Disaster Declarations for natural hazards in Louisiana. The total federal assistance paid for these disasters is over $26 billion. The actual damages far outstrip federal assistance – the costs of Katrina and Rita alone are estimated between $90 and $140 billion. And then there is the human cost – nearly 1500 deaths, and nearly 200,000 people still displaced. (http://www.ohsep.louisiana.gov/hlsmitigation/hazmitigatpln.htm). $15,760,144,120 was paid out in flood insurance claims (http://www.fema.gov/hazard/hurricane/2005katrina/statistics.shtm).

9.3.2 Which 'rules' are applied upon these funds?

Federal Assistance based on the Water Resources Development Act

The Water Resources Development Act lays out the procedures by which the Army Corps of Engineers is allowed to instigate flood defense projects on its own, without specific Congressional approval. It states that communities must split about 50-50 the cost of individual construction projects with the federal government.

The development stimulus of these policies is further augmented by federal aid that reduces the cost to localities of providing infrastructure in hazardous areas, such as water and sewerage service and highway access.

The Corps tries to make this rational by means of guidance and policies. However, most, if not all, flood projects are individually mandated by Congress - the Army Corps has very little independent discretion over building projects; these are "pork barrel" policies. The incentives of "pork-barrel" politics (distributive politics) in Congress are such that many, if not most, flood defenses are financed on an individual basis by the federal government. In the U.S., members of Congress are elected in single-member districts and are accountable to those districts. So, there's a long-standing informal understanding in both political parties that individual Congressmen are allowed to designate specific projects for their districts. It's a good electoral tool here - since levees, etc., are visible construction projects, a Congressman running for re-election need only point to these projects as proof that he or she "is getting the job done". Hird (1991): "In previous studies of distributive politics scholars have investigated legislative influence without accounting for the policies' independent merits. As a result, they have failed to include a plausible explanation of the counterfactual (i.e., which projects would have been funded in the absence of congressional committee influence), which has led to invalid inferences regarding legislative influence. The model of distributive politics is reformulated to account for an assumed efficient and/or equitable project allocation in the absence of legislative influence."

Using data from proposed Army Corps of Engineers' projects and the funding recommendations of three institutions, the findings indicate that pork barrel politics indeed exists and imposes significant efficiency costs but that both equity and economic efficiency play prominent roles in the decision-making process as well. Cost-benefit analysis is seen to play a constructive role by improving the efficiency of project choice; and the corps's cost-benefit analysis guidelines are beneficial from the agency's organizational perspective, as well.

Post disaster insurance (NFIP)
The NFIP does not finance flood defenses, but it lays out community-based criteria for zoning and building requirements in order for a community to qualify for federally-backed insurance. Individual property owners who live in flood zones in communities that have met NFIP standards are then required to purchase the flood insurance. In the US, most private home-owners and business insurance does not cover damage from floods. You either have to purchase an additional insurance premium privately or, if you live in a flood zone, from the NFIP. Mortgage companies generally require flood insurance if you live in a flood zone before they will give you a home owners loan, but people often let their insurance coverage lapse after a few years.

A Community Rating System of the NFIP was established by FEMA as an incentive mechanism aimed at recognizing and encouraging exemplary community floodplain management that exceeds minimum NFIP standards. Flood insurance premiums for residents of communities participating in the Community Rating System are lowered to reflect the reduced flood risk that is a result of community activities that meet the three goals of the Community Rating System: reducing flood losses; facilitating accurate insurance rating; and promoting the awareness of flood insurance. The 1049 communities that participate in the Community Rating System today represent 66% of all NFIP policyholders nationwide. Policyholders in Community Rating System communities receive premium discounts ranging from 5 to 45%. (One community has achieved a rating entitling its policyholders to a 45% discount.) In 2006, the Community Rating System premium discounts amounted to $191 million.

Tax relief for open land
Some state and/or local tax codes have provisions whereby property owners pay reduced property or income taxes if their land is kept as open space or donated for public use. Such tax relief is available Louisiana (ASFPM, 2003).

9.3.3 What are the sources of these funds?

Local communities do raise revenues through property taxes and special levies on flood risk developments. Most local investments are probably made by property owners, defending their property and in response to the requirements of the NFIP.
All federal flood defense programs are financed from the general budget, except those that are financed directly from offshore revenues off the coast of Louisiana. Damage compensation is paid from the insurance premiums. Premium discounts (categories of structures that are subsidized by the premiums paid on other structures) are internal to the NFIP, that is, paid for by other flood insurance policyholders and not by federal taxpayers. An exception is that catastrophic events and losses are not factored into premium costs, thus the taxpayers do help fund the program in catastrophic loss years (“bailing out”).

9.4 Reflections by influential actors in the governance system

9.4.1 What are the crucial elements of governance arrangements that could increase safety?

Sources indicate several forms of failure to achieve “rational” levels of protection. There is wide agreement, however, that the insurance system in relation to personal initiative is a sound idea; only that it doesn’t perform well in practice (a detailed critique by the association of state flood managers is included in the appendix). This is due to the Presidential bailouts, and little willingness to take local collective measures. Scholars indicate there is a need for more cooperation, which emerges only slowly.

Interference between the NFIP and the WRDA
In case of flood defense projects, the Water Resources Development Act (WRDA) requires the Corps (or NRCS) to first find a local sponsor. The NFIP requires communities seeking federal flood insurance to devise local flood control projects. The intersection of these two pieces of legislation clearly lies in narrowly conceived projects aimed to protect one town or watershed district without regard for upstream or downstream consequences. This situation is only further hampered by the existence of numerous nonfederal flood projects (Holahan, Pers. Comm.).

Levees induce more risk (Burby 2006)
Given this high level of risk in New Orleans, Congress, following devastating hurricane losses in 1947, authorized federal assistance for levees that would make it possible to convert ninety-six hundred acres from wetland to “productive use.” Following even larger flood losses from Hurricane Betsy in 1995, Congress authorized construction of the Lake Pontchartrain and Vicinity, Louisiana, Hurricane Protection Project, which sought to protect virtually all of Orleans Parish and the northern (east bank) portion of Jefferson Parish from storm surge flooding from hurricanes up to a one in twohundred-year recurrence interval. It proposed to do this by raising existing levees and constructing new levees along much of the southern shore of the lake.

These levees would help prevent a recurrence of the losses experienced from Hurricane Betsy, and, more important, they would facilitate continued urbanization of this very hazardous region. In fact, protection of existing development accounted for only 21 percent of the benefits needed to justify the project. An extraordinary 79 percent were to come from new development that would now be feasible with the added protection provided by the improved levee system.

Although Hurricane Betsy revealed the potential for widespread flooding of the low-lying areas of both parishes, the construction of improved hurricane protection works and availability of flood insurance evidently persuaded thousands of households that the region was reasonably safe. In its 1999 New Century New Orleans Land Use Plan, the city planning commission argued, there are extensive opportunities for future development of the vacant parcels that range from single vacant lots to multi-thousand acre tracts. Long term, these development opportunities represent not only population increases but also significant potential employment for the city. (City Planning Commission, 1999, 201) Ironically, just six years later, the entire area of urban growth the city had been promoting and the Corps protecting for forty years was entirely under water (Burby, 2006).

Illustrations of "weak" New Orleans government (source: Burby, 2006)
1) In a 2005 article the Washington Post on the New Orleans levee systems wrote, "Local officials often resisted proposals to protect their communities from storms because they did not want to pay their share of federal projects." Decisions recounted to support this contention include the following. The Orleans Parish Levee Board lobbied the Corps of Engineers for protection to the level of a one-hundred-year, rather than two-hundred-year, hurricane after the local share of the cost of the Lake Pontchartrain and Vicinity Project had escalated many times beyond original estimates. The levee district also opposed hurricane protection floodgates at the mouths of the city's drainage canals, which led to the construction of the walls along the canals that failed in Katrina.

2) in the early 1980s the Federal Insurance Administration (FIA) launched a subrogation suit for more than $100 million against Jefferson, Orleans, and St. Bernard parishes (subrogation occurs when an insurance entity that pays its insured client for losses then sues the party it contends caused the damages). The FIA contended the parishes caused it to pay excessive flood insurance claims by failing to maintain levees and failing to enforce elevation requirements for new construction, which then led to buildings being flooded and their owners to seek compensation from the federal flood insurance program. The courts ruled in the FIA's favor and ordered the parishes to improve their levee maintenance and enforcement practices.

3) Subsequent to authorization of the Lake Pontchartrain project, Congress authorized the Corps to construct four additional hurricane projection projects, including one to add to and strengthen levees protecting the west bank sections of Jefferson and Orleans parishes. However, the Lake Pontchartrain Hurricane Protection Project fell behind its construction schedule, in part because by the 1980s costs of the project had escalated more than 1,000 percent. In addition, the Washington Post claims "Local officials resisted the goal of Category 3 protection for their communities as overly extravagant. In 1982, the Orleans Levee District urged the Corps to 'lower its design standards to provide more realistic hurricane protection' and argued that 100-year protection would be fine."

Despite NFIP there is often little flood awareness (Chivers and Flore, 2002)
The National Flood Insurance Program (NFIP) was established in 1968 and requires mandatory flood insurance for property owners who have federally backed mortgages. A compulsory national flood insurance program could greatly improve the economic efficiency of flood plain occupancy in the United States. However, in order to realize the suggested efficiency gains, property owners must have sufficient information about flood risk and insurance premiums to make well-informed home purchase decisions. Survey data from Boulder, Colorado, suggests significant evidence of market failure in information in the NFIP program. The majority of survey respondents, all of whom live in a special flood hazard area, report they did not fully understand the degree of flood risk or the cost of insuring against this risk when negotiating the purchase of their property.

Making space for water
What in The Netherlands is termed "the paradigm shift", is occurring in the USA as well: there is slow recognition that certain areas better cannot be developed as residential or industrial area. Burby (2006) summarizes the observations above as follows: "The unprecedented losses from Hurricane Katrina can be explained by two paradoxes. The safe development paradox is that in trying to make hazardous areas safer, the federal government in fact substantially increased the potential for catastrophic property damages and economic loss. The local government paradox is that while their citizens bear the brunt of human suffering and financial loss in disasters, local officials pay insufficient attention to policies to limit vulnerability."

Federal pork barrel politics

Pork barrel politics has already above been identified as a prevailing 'rule' for allocating federal funds to local defense projects. Burby (2006) thinks that disaster losses can be blunted if local governments prepare comprehensive plans that pay attention to hazard mitigation. The federal government can take steps to increase local government commitment to planning and hazard mitigation by making relatively small adjustments to the Disaster Mitigation Act of 2000 and the Flood Insurance Act. (..). "Platt (1999, xvii), "On the one hand, the federal government is called upon to assume a major share of state, local and private economic costs of disasters. . . . But on the other hand, the government at all levels is increasingly impotent to demand . . . that local governments and individuals assume the political and financial burdens of curtailing unwise development in hazardous locations."

Louisiana and New Orleans governments have been reluctant to invest in safety in the past. People in New Orleans may have thought they should rely on the federal government, there seems to have been a kind of debate between local and federal level about who should do what, resulting in a stalemate (before Katrina). The moral hazard created by the federal government created a system in which no one felt any urgency to do anything. Short time-horizons of local, state, and federal elected officials meant that there was no 'urgency' to do anything. In general it's much easier to respond to a disaster than to plan for it in advance. If a flood is prevented because of good policy, how can an elected official 'credit claim' for the achievement – no one would know it happened. If you spend lots of money on costly re-investment into infrastructure people will inevitably complain that the government is wasting money.

A culture of federal non-interference in spatial policies, and ill developed spatial politics in Louisiana

An October 2005 analysis by the Brookings Institution Metropolitan Program noted, Federal policies and investments in flood protection facilitated development in dangerous locations . . . and failed to discourage floodplain development. . . . [T]he traditional federal deference to state and local land-use planning has meant that federal spending on levees and other protections has been unaccompanied by sensible restrictions on subsequent construction. . . . At the same time, the availability of subsidized federal flood insurance for new development in flood plains . . . also represents a failure of Washington to take the lead in discouraging communities from building in harm's way. (Brookings Institution Metropolitan Program, 2005, p.23, 25)

The influential Association of State Floodplain Managers focuses wholly on a spatial approach, and is critical, in particular relating to federal policies. As regards state and local policies, they provide guidance for comprehensive land use planning (see appendix).

Moral hazard and Burby's proposition

The insurance system has side effects. Since everybody is insured, there is little incentive to take action. Those who are not insured profit from those who are insured and pay for defenses from which other cannot be excluded. The major change Burby has in mind would involve amendment of the (national) Flood Insurance Act to shift the program from insuring individuals and businesses for flood losses to insuring communities (and all of their dwellings and commercial/governmental buildings). The reasoning behind this proposition is explained in the appendix.

Generally speaking there has been an exponential rise in presidential declarations over the past 50 year (http://www.fema.gov/news/disasters.fema). These are bailouts: property owners who didn't own flood insurance are often now eligible for disaster relief, and certain scholars believe that this is one of the major reasons many people don't buy flood insurance premiums.

New cooperative bodies at state level
A joint Federal-State body should be given the responsibility and organizational and fiscal support for guiding the program. Authorization and financing should be separated from the WRDA process (recommendation by the Working Group for Post-Hurricane Planning for the Louisiana Coast, 2006).

9.4.2 How do subjects respond?

Since there are no legal safety standards, there is little to be enforced. It is clear from the above, that subjects (citizens, corporations and local authorities) often do not think it is necessary to pay their share of the cost of larger scale flood prevention. A minority is insured. There is reliance on Presidential bailouts, and anticipation of projects from Congress at lower costs (pork barrel politics). Also, there often is little risk awareness (although in New Orleans this is not to be expected).
The National Research Council, a division of the National Academy of Sciences, argues in its 2004 report that members of the Army Corps of Engineers feel hamstrung by federal regulations—i.e. the professionals in the Corps recognize a need for a multi-state integrated approach, but federal law basically forces them to provide flood defenses in one locality after another.

9.4.3 To which dilemmas does this lead?

The key dilemma seems to be the US prepared to become slightly less liberal by giving stronger incentives to local governments to make conscious risk assessments and engage in dialogue with their citizens. This might include measures like making the co-financing procedure more technocratic (and less susceptible short-term to political action). Burby (2006): “The wake of Hurricane Katrina provides an opportunity for the federal government to use the public concern created by the disaster to spur more local governments to prepare comprehensive plans that address hazard mitigation. (..) In addition, if the government reorients the NFIP so that more of the burden of responsibility for insurance coverage is borne by local governments, local officials may become more committed to limiting development in hazardous areas and to mitigating the hazard to existing development at risk.”
In general American public opinion still strongly dislikes government involvement in most areas of life, at all levels of government. Huge government projects are difficult to justify in the US.

9.4.4 Which new arrangements are proposed to solve these dilemmas?

The main sources are Burby (2006) and the Association of State Floodplain Managers. They both suggest that the insurance system should be improved and that more incentives are needed for local authorities to take responsibility and manage dialogue and cooperation. After Katrina the need of more cooperation has penetrated New Orleans state policies, as indicated above. However, at national level, as well as state level, the debate focuses on raising budgets within the existing institutional arrangements. The suggestions by the ASFPM are included in the Appendix. As regards Burby (2006): “The political considerations of the president and Congress that create the safe development paradox are not likely to change. Federal assistance following disasters is likely to increase with increasingly severe disasters, as will federal efforts to make places at risk safer communities in which to live and work. What can change, I argue, is uninformed local government decision making about urban development that results in millions of households and businesses occupying at-risk structures in vulnerable locations. The vehicles for bringing this about are federal policies that (1) require local governments to prepare comprehensive plans that give due consideration to natural hazards and (2) require local governments to assume greater financial responsibility for the consequences of their urban development decision making”.

9.4.5 To which extent does the governance system reflect on itself?

As indicated above, the problem of the organization of flood management is seen as a problem of optimizing within the constraint of institutional settings. Self-reflection is limited to that, making more proactive policies difficult.

FEMA (2002) reflects on the planning of flood management
It is clear that FEMA was in 2002 aware that more proactive policies are needed. “In addition to providing pre-and post-disaster planning assistance to States and communities, FEMA has undertaken a number of other initiatives to encourage communities to undertake mitigation planning and to incorporate natural hazards into their comprehensive land use planning. (…) A series of “how-to” manuals on natural hazards planning is being developed for publication in Fall 2002. One of the “how-to” manuals, Understanding Your Risks: Identifying Hazards and Estimating Losses, was published in August 2001. FEMA expects to encourage State and community planning through the new pre-disaster mitigation provisions of Disaster Mitigation Act of 2000. Information on mitigation planning programs and guidance can be found at www.fema.gov/fima/planning.shtm.”

Louisiana
Out of the fragmented structure, cooperation emerges. Louisiana Governor’s Commission (2007): “this line of inquiry is being explored in ongoing discussions among the Executive Assistant for Coastal Activities and the secretaries of the Departments of Natural Resources and Transportation and Development. This group is investigating the best ways for their agencies to interact as the program ramps up in the coming years. The group has looked at other models, from the Florida Everglades Program, to the CALFED Bay-Delta Program in California, to the Big Dig in Boston. Based on the results of the group’s research and conclusions, a memorandum of understanding among the three agencies will likely be introduced in 2007. This memorandum will present a framework for enabling the agencies to work together while also incorporating the best possible technical expertise in all aspects of the program’s activities.”

However, such cooperation apparently is not automatic, since cooperative bodies even make public calls for cooperation. For example, the Governor’s Advisory Commission on Coastal Protection, Restoration, and Conservation wrote the box hereafter in its 2007 report about the Master plan for a sustainable coast (adopted by the state in 2007). However, the Corps is already member of this commission, as its website states, according to the Breaux act.

> The commission strongly encourages the U.S. Army Corps of Engineers and other federal partners to adopt the overall rationale of the Master Plan.

How can this be explained?
Deep factors are:
- the relationship between the federal government and the states – its deference to participate in spatial planning
- the stalemate between local level and federal level as regards “who should / will pay”
- the liberal attitude (personal initiative) combined with a tendency no to use tax money (certainly not at local and state level)

Congress is generally seen as problem holder for flood protection, it has become a scapegoat. Prior to 1927 the federal government had virtually no role in flood control or disaster management generally. Following massive flooding that year, and an increasing awareness of the human-induced causes of flooding, elite opinion changed from viewing it all as ‘Acts of God’ to human-induced. With the massive changes in the scope of the federal government during the Great Depression in the 1930s and later the federal involvement in social welfare in the 1960s, people began to look first to federal oversight in flood

control. Really the problem boils down to the fact that Congress began bailing out disaster areas by providing assistance after disasters. Eventually some felt that if the federal government was going to do this, it should also try to minimize damages when it does occur - thus NFIP in 1968, etc.

It makes rational sense for Congress to get involved these days for electoral reasons. Virtually every piece of federal legislation that deals with disaster assistance directs local governments to act. With NFIP for example the federal government provides much of the funding, but it's up to the local communities to enact zoning ordinances. State agencies often certify compliance with the terms of federal laws, but this is not the case in New Orleans. The reason is not that state or local authorities lack resources to do anything. Rather it's that the federal government has shown its willingness to act, so local authorities can 'pass the buck' and the blame to them. It's a classic Moral Hazard problem - because the federal government is willing to provide funds and resources, local authorities have little incentive to act on their own.

Most people understand that New Orleans is situated in an unsafe area. The only problem, of course, is that New Orleans is the largest sea port in the US and most agricultural produce from the Midwest gets to the ocean via the Mississippi. So, everyone agrees there needs to be a city there, but people disagree as to how large it should be and whether the Louisiana delta should or should not be damed. Most scholars and government officials would probably agree that restoring wetlands in the delta is the first step to protecting New Orleans in the long run, but it's a politically difficult thing to do. The problem may come back to the political incentives of Congress - no one sees that restored wetlands or local zoning ordinances that prevent building in flood zones, are effective flood defense measures. So, Congress can't "credit claim" for doing anything. Building levees, on the other hand, are extremely visible signs that the government is "working", even if 'experts' agree that a more integrated approach is needed.

Frequent recurring floods (even from local rain storms) and hurricanes have created urgency at national, state and local level. However, the National Flood Insurance Program (NFIP) has had perverse effects. The national state created an expectation that risks were covered and therefore acceptable. Incentives to reduce risk at local level, through a wise spatial development, were not effective. Wise development goes at a local cost, since opportunities for short-term, economically attractive development are lost. Local politicians were seduced to 'transfer' this political risk to the national level, and to their successors. Residents and businesses were not properly informed about risk.

10 COLOPHON

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Dhr. prof. dr. W. van Leussen
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Dhr. H. Havekes
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Dhr. M. van der Vlist
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Directoraat-Generaal Water

APPENDIX 3 Inventory of 8 countries

BELGIUM

The case

The decree Integral/integrated Water policy of 2003 formalized the basin approach in Flanders. This approach has however already been applied more and more since the beginning of the '90s, with the foundation of some 'pilot' basin committees in the period of 1990-1993 and subsequently the forming of committees in other basins in the period of 1997-1998.

Since 2001 work has started on basin management plans. After the materialization of the decree the organizations foreseen by the decree have been formed. The most important are the 52 district water boards that have been formed in 2006. At the moment two parallel "waterboardish" structures exist in Flanders:

- 104 polders/wateringen: old structures that often lead a somewhat sleeping existence, responsible for the management of the small and medium-sized unnavigable waters. About 50% of the surface of Flanders is part of the management area of polders/wateringen.
- 52 water boards: herein the provinces boards, municipal boards and polders/wateringen cooperate on the basis of their existing authorities in order to reach integrated water management on (sub)basin level. Water boards don't have any authority or budget and function primarily as a consultation platform. The provinces have a secretarial function and appoint basin coordinators. Basin coordinators are often in charge of a number of water boards.

There are 11 basins and 103 sub basins in Flanders. The boundaries of the sub basins are not in line with the boarders of the polders and wateringen. The Flemish Region/District (through the Flemish Environmental Society, VMM) takes care of management on basin level, the lower governments (and water boards) are responsible for the sub basin level. At the moment (sub)basin plans have been set up, these are however not yet approved by the Flemish Ministry of Environment. A bottleneck in the approval of these plans is a provision in the decree concerning an implementing order that has to be taken on the financing instrumentarium for flooding areas that are foreseen in the sub basin plans. Consensus on this financing instrument (mostly compensation for the missed agricultural incomes) has not yet been reached.

De water boards mainly 'live' because of the determinedness of some civil servants. Provinces are great supporters of water boards. They are responsible for the secretariat and are the strongest actor within the water board. The impression exists that the other involved organizations are positive about this directing role of the provinces and extend their cooperation (at least to the consultation).

The existing division of authorities is (consciously) not adjusted and is in short organized as follows:

- waterpurification:
  - Aquafin (PPS party) is responsible for the construction of the so-called above municipality level infrastructure (purification and the bigger sewer systems).
  - Municipalities are responsible for the construction and maintenance of sewerage.
  - Flemish Region/District acts as the client for Aquafin, responsible for planning and arranging the prefinancing for the works.
  - Most important bottleneck: municipal sewerage. Mainly because of the lack of money this is not well organized. Because of this Flanders does not meet with the EU-guideline on Urban Waste water.

- watercourse management:
  - navigable watercourses: at the Flemish Regional/District level this is arranged under the Domain Mobility and Public Works, within this domain it is divided over several services (most important is Administration Waterways and Marine - AWZ).
  - unnavigable watercourses: is part of the Domain Environment, Nature & Energy. Three categories:
    - category 1 (broad / province-crossing): under the Department Water of the VMM
    - category 2 (medium-sized / municipality-crossing): under the province (unless in management area of polder/watering – then under polder/watering)
    - category 3 (small): under the municipality (unless in the management area of the polder/watering then under polder/watering)

The effect of the establishment of the water boards is mostly the creation of a formal consultation structure. The existing fragmentation is being (partially) compensated because involved organizations have a common platform now. At the moment the biggest challenge for the water boards is the enforcement of the (sub)basin management plans. This is mainly being prepared by the (individual) water board coordinators.

Research questions	
Research questions	**Findings**
▪ **How does the cooperation within the basin work?**	Responsibilities are divided over several parties. Cooperation has been formalized within the water boards, forming the consultative bodies between the involved governments at regional level. Herein the provinces have a coordinating (secretarial)role. The success of the cooperation mainly depends on the involvement of the responsible civil servants.

Deepening of insight on themes	
Themes	**Findings**
▪ **Participation and awareness**	In the framework of the plan forming around the (sub)basin management plans a lot of time and effort has been invested mainly to make social organizations think along wanting to achieve an open planning process. There have been variable experiences. At the moment citizens in Flanders are still not very much aware of the working of basins, general water awareness is low.
▪ **Regional cooperation**	Regional cooperation has expanded because of the elaboration of sub basin management plans and the establishment of water boards. The fragmentation of tasks and responsibilities has not been adjusted (see above).
▪ **Integration of Water and**	SP and water (environment) are part of different domains in Flanders.

Spatial Planning (SP)	There is a history of ill-will between these domains. SP feels responsible for the spatial consideration of spatial claims (water is one of them). Environment want to be stronger opposed to SP, more say in space for water. During the development of the basin management plans in the beginning Environment took a very offensive stand, statement were made in plans about spatial choices. SP did not accept this which resulted in tension. At th moment the relationship is better. A (parttime) civil severvant from SP also takes place in the basin secretatiat at the moment. The involved domains (SP, Mobility, Environment) sit together because of this enhancing the (personal and with that the professional) understanding between the domains. Another factor improving the relations was the fact that the basin management plans did not go as far on spatial planning as was originally expected. For the whole of Flanders there is also a consultation platform 'Integrated Water Management' and SP is also represented here.

Conclusion/ possible lessons:

- The organization of consultation platforms can compensate the fragmentation within water management.
- Cooperation is formed within a specific planning process (basin management plans) – there is a (long) start-up phase before the formal organization was fixed this resulted in a shared vision on the problems within a basin. At the moment an effort is being made within the water board structure to reach consensus on the solutions for this.

Sources:

- Ann Crabbé, De bekkenwerking in Vlaanderen: een beleidsarrangement in de kering, Universiteit Antwerpen, Steunpunt Milieubeleidswetenschappen, november 2005
- Interview with Ann Crabbé in Antwerp d.d. 18 januari 2008

DENMARK

The case

Water Environment Action Plans (WEAP) have formed the core in Danish water management throughout the last 20 years. The first WEAP from 1987 focused on direct discharge from agriculture and larger WWTP's. The second from 1998 increased the focus on diffuse nutrient pollution from agriculture. The third WEAP from 2004 focused on protection zones around inland waters as a mean of reducing diffuse nutrient pollution and erosion.

In 2007, Denmark underwent a major institutional reform. One regional level (county) was abolished, another formed (region), municipalities restructured (from 275 to 98) and major changes occurred in the organisation of the Ministry of Environment.

The Ministry of Environment has three major departments (agencies) since May 1st 2007:

- Agency on Forests and Nature (AFN)
- Agency for Environmental and Spatial Planning (AESP)
- Environmental Protection Agency (EPA)

Under AESP 7 Regional Environmental Centres (REC) have been created which are divided over the 4 River Basin Districts and manage a total of 23 catchment areas.

In general, responsibilities are outlined as follows:

- Ministry: setting general guidelines, defining policy (national water management plan), responsibility for the sea;
- Regional Environmental Centres: monitoring, enforcement of discharge standards at municipal WWTPs;
- Regions: limited responsibilities, for water only regarding contaminated groundwater;
- Municipalities: permitting (abstraction and discharge, for some permits EC comment needed), sewerage master plans, municipal water action plans (WFD), spatial management plans, responsibility for all streams and bathing water quality.

Due to the reform, municipalities got a far greater responsibility in the water field. As part of the ongoing reform, municipalities are obliged to set up public private sewage and drinking water companies by January 2009. This is especially new for the sewerage sector, as for drinking water supply since many years (small) private companies already exist. Most of these companies can be regarded as self-organised voluntary associations - inhabitants of a locality organise their own drinking water supply and maintain it on voluntary basis.

Water Framework Directive implementation

The Ministry of Environment is Competent Authority for WFD implementation. MoE prepares a national water plan that will serve as the River Basin Management Plan. The plan will consist of environmental objectives and *suggestions* for measures - and will not contain a programme of measures itself. These are to be prepared by the municipalities in Municipal Action Plans, that are to be finalised by the end of 2010. Exactly how much autonomy the municipalities will get in developing these action plans is at the moment subject of discussion. Unofficially the MoE has asked their Regional offices to prepare first drafts of programmes of measures that would ensure that all environmental objectives will be reached. Exactly how these will feed into municipal action plans is uncertain.

Denmark has just finalised a first national public consultation round (fully web-based), in which organisations and individuals could present their proposals and comments for among others measures to be considered during preparation of the Water Plans. Such a first hearing is required under Danish law and was coordinated by the RECs.

Insurances (off-topic)
Everybody who has insurance contributes to a state 'stormboard' fund that is managed by the insurance companies. This fund is meant for payments due to extreme events like natural disasters. Currently there is a discussion going on to change the definition of extreme events as the insurance companies are now facing high costs because of weather events that do not fall into this category. Insurance companies want more events to be put under the storm board coverage.
Furthermore a wastewater fee is paid for nitrogen (20Dkr/kg), phosphorus (110 Dkr/kg) and organic material (BI5 11 Dkr/kg) for all outlets from WWTP's and seepage, this fee was introduced in 1996.
In the period from 1994-1998 a green tax on water was implemented which meant an increase from 1 Dkr to 5 Dkr for each m³ during the period. This is giving a yearly revenue on approximately 1,6 billion Dkr. Taxes are paid fro all water that is pumped out from the waterworks, which has increased the effort to find and stop leaking pipes.
Water distribution and sanitation is paid by users while monitoring and water planning and administration is paid by taxes. The water and sanitation fee is generally paid on one bill and the rates are approved by the municipality

Research questions	
Research questions	**Findings**
Which role do municipalities have in water policy and management?	Municipalities are *the* central actor. Although the Ministry provides goals and policy guidelines, municipalities are responsible for definition and implementation of measures. Surface water management, sewerage / waste water treatment, drinking water supply and spatial management are all under the responsibility of municipalities (the extent of this responsibility however is still subject of discussion).
What is the influence of river basin districts on integration of water and spatial management/planing?	River Basin Districts are actually not management units. Regional Environmental Centres under the MoE Agency for Environment and Spatial Planning are organised on a regional basis, however integration takes place mainly at the level of municipalities.

Deepening of insight on theme's	
Theme's	**Findings**
▪ **Regional cooperation**	Although most water related tasks fall under the municipalities, the Regional Environmental Centres provide a supporting role. Each REC has set up a Water and Nature Board, consisting of all municipalities in the region, NGOs and representatives of water users. This Board mainly serves as a consulting body. As mentioned above there are River Basin Districts, REC regions and catchment areas. Within the River Basin District Saeland (the island on which Copenhagen is located) for example there are 2 RECs and 6 catchment areas.
▪ **Integration of Water and Spatial Planning**	Integration takes place at municipal level. Before the government reform municipalities were only responsible for urban spatial planning, rural planning was carried out by counties. Now municipalities are responsible for both and prepare municipal spatial management plans in a four-year cycle. Within these plans special areas are designated that are suitable for wetland restoration, recreation areas, nature areas and regulations are given for the use of water and the coastal zone. Municipalities are (most likely) also given the responsibility for defining and implementing programmes of measures (municipal water action plans) under the WFD. It is expected that integration therefore takes place at municipal level.

Conclusion/ lessons:

A lot of things are changing in Denmark right now. Especially the role of municipalities has been evolving greatly during the last year. It seems that this strong role of municipalities is rather unique. Interesting would be to find out exactly how much autonomy the municipalities (will) have, for instance in developing the WFD programme of measures. There seem to be two forces:

- larger autonomy and more responsibility for the municipalities, underlined by the large amount of choice municipalities get in developing WFD measures;
- stronger central coordination, shown by the fact that MoE wishes to present a 'longlist' of measures (including calculation of their effects) to the municipalities out of which they have to choose.

The Danish strategy regarding WFD river basin management plans is remarkable - Denmark aims to present plans to the European Commission that contain environmental objectives and only potential measures. Exactly which measures are to be carried out will not be put in the RBMP as these are worked out by municipalities in municipal action plans (to be completed by 2010).

Sources:

Findings in this factsheet are based on a discussion on January 11th with various water management specialists of Grontmij/Carl Bro in Glostrup and an interview with Mrs. Kirsten Flemming Hansen of the Ministry of Environment in Copenhagen.

FRANCE

The case

In France a distinction has been made between water allocation (Agences de l'Eau) and the management of flooding (DDE and DIREN – en recenter de Etablissements Publics Territoriaux de Bassins (EPTB). These are decentralized national agencies. There are big differences in how these operate on a decentral level. The Agences de l'eau work on the basis of pollution levies, do functional allocations and regulate irrigation. Recently they have gotten a central role related to the KRW. Spatial authorities lay with the ten thousands Mayors of the municipalities, with the approval role of the Prefet of the department/region.

The best researched and most successful case on participation is the Dordogne, where the general intermediate layers of the general management (Region, Department) took initiative for a integrated water process and the decentral natural agencies took a more following part. It entailed water inconvenience, draught and quality.

With water inconvenience in France there is a combination of risk-transparency, own responsibility and a insurance based on solidarity between people with and without risks. The DDE/DIREN/EPTB's give advice to the general management (intermediate layers Departements), who make a spatial plan which the municipalities (communes) have to take in to account. This entails different risk-zones. There is no duty to prevent and protect, and in practice a lot of Communes don't have a plan (Europlano). Municipalties can make citizens take preventive measures up to 10% of the value. Everyone is ensured, as long as there is a plan and as long as measures have been taken. There is no enforcement policy for spatial measures to retain water upstream (Guide ralentissement dynamique prévention des inondations). When it comes to pollution it mainly concerns agricultural emissions.

Research questions	
Research question	**Findings**
▪ **How is water inconvenience being approached?**	**The mayors.** First responsible for flood risk is the Mayor of each of 36000 communes. He must take precautions convenables (appropriate measures). His power is to demand from owners of dikes to take these measures. He should take action in times of flooding (assistance operations); based on a plan (Plan Communal de Sauvegarde). He must take responsibility for the risks of spatial plans and should take flood risk plans into consideration by giving the inhabitants information about these risks. Mayors are encouraged to take other measures to make sensitive objects less vulnerable (eg what to do when a school is flooded?). **The state.** The prefet of each department must inform the mayors about the flood risks in their territory and define rules for urban development in flood plains in the plans de prévention des risques d'inondation (PPRi), which must be established through a public procedure. The PPRi are actually prepared by decentralized state offices, the DDE or DIREN) "sur prescription du Préfet"[16]. He takes over the

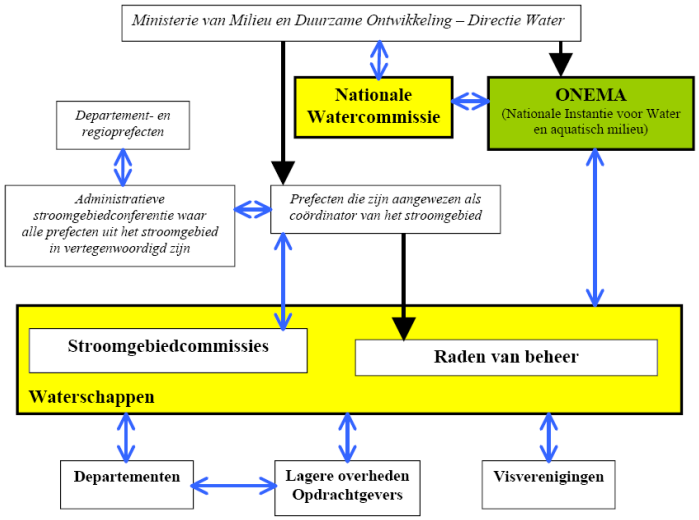
[16] Formal relationship between the departement (prefet) and the state (DDE en DIREN) is not clear

	tasks of the mayors if a flood encompasses several communes. It is responsible for the "police de l'eau", ensuring that the owners of dikes maintain their strength. **The PPRi, which is an annex of a spatial plan, can impose preventive measures up to a maximum of 10% of the value of the protected goods.** **Residents of flood plains.** These are responsible for their own safety. They cannot demand the state to raise dikes or other structures. Exceptions are specific flood plains near the Loire, the Rhine and the Rhone. Otherwise, the collectivites territoriales (departments, communes or regions) may take such measures, in which case they may require the beneficiaries to finance the expenses. **The owners.** The owners of objects built or non-built must annex to their contract the risks that they accept. Campings must have evacuation plans. Owners of dikes and defensive structures must maintain these. **The collectivite territoriales** (communes, regions, departements (counties)) have no obligation to prevent floods. Still many of them undertake such effort. The state encourages them to develop flood management strategies, dealing with general spatial development issues. **The Etablissements Publics Territoriaux de Bassins (EPTB)[17],** put in place in 2003, are responsible for flood prevention and balanced management of water. They are cooperations of collectivite territoriales. They operate on a basis of subsidiarity and vary across France. The ministry of ecology has asked them to develop PAPI (programmes d'action de prévention des inondations), which enable them to discuss water risks at the level of (sub)basins. They address water retention upstream, public awareness, actions to prevent vulnerability (42 PAPI, 170 millions d'euros, période 2003-200). **Insurance.** In case of flood damage, this will be remunerated by a national insurance, based on the principle of national solidarity. The Fonds Barnier is a national fund, administered by the central treasury of insurances, and financed by a general levy on insurances of natural risks (?) and the state. It serves to expropriate land at high risk and remunerate flood damage, as well as cost of hazard studies and works to prevent flood risk. **Remuneration is reduced in areas without flood risk plans or where people build in hazard zones.** **Solidariteit upstream – downstream:** the guide dealing with this issue indicates that PPRi can only be based on solidarity if a wide agreement on the data and principles of solidarity emerge in the basin. (In other words: whereas the state has the power to enforce preventive measures upstream, it can only be enacted if there is wide support). **Plan Loire.** The main example used nationally is the Plan Loire, which appears to

[17] Relation re DDE ou DIREN unclear; possibly it is reorganization from department to basin as geographic principle.

	have produced transparency but little real action.

Deepening of insights on theme's	
Theme's	**Findings**
▪ **Participation and awareness**	In the Dordogne a more integrated public dialogue emerges because public participation enhances the need of sectors to join forces. Spontaneously a cooperation body developed. Besides this the body did not have specific authorities, but made use of GIS and strong visualizations. The Dordogne can form an example for other parts or France and even for other policy areas (Bernard Barraqué ea 2004).
▪ **Regional cooperation**	If this will work depends strongly on the personal qualities of the mediators; there are example of successes and failures. Success also depends on visible short term results. Only after a new actor came into being success was reached, in the form of a river authority for the Dordogne. This was spontaneous cooperation between the six departments of the water basin. The water managers "helped" and "followed" this process. Even though cooperation was not formally arranged good cooperation took place in the Dordogne. More recently there have been discussions on how to arrange this kind of processes. With this the Agences de l'Eau (water boards) obtain a more central role. According to an undated document "French bill for Water and Aquatic Environment". As a result of the European Framework Directive for Water, which is aimed at regulating the quality of surface- and groundwater in Europe for 2015, the French government has deemed it necessary to review their whole water policy. Fall 2002 the French government started with taking measures to convert the French rules into the European directive, but also to take measure against, cq. Develop policy for flooding wet areas, reform of protected areas for water harvesting, reform of water policy, oversee departments etc. The French government has made use of the opportunity to organize a decentralized debate in 2003 and 2004 with all the French stakeholders, including the big public, for the area of water. This debate confirmed that the French water policy needs a reform in order to reach the objectives from the European Water Framework Directive, raise the efficiency (mainly by clarifying the expertise of each party), improve the actions from the water policy and to meet the expectations of users for the area of transparency and clarity. The debate formed the basis for the design of the law on water and aquatic environment, that has been passed after the first reading this spring by both the senate as the Assemblée Nationale. The law will be included in the legistlative part of the Code de l'Environnement. The law creates the conditions that have to guarantee that the objective related to quality of suface- and groundwater will be reached in 2015 and make sure that all the European directives in this area can be complied with. The design of this law has consequences for the organization in the area of water. The new organization

	will look as follows: 
▪ **Integration of Water and Spatial Planning**	The weak formal link between water inconvenience and quality is not seen as an issue. By the consortium of general and specific management both could be related to each other where needed. Enabling each to take up the result in their own sectoral plans. The Dordogne is however way ahead; other sub basins have more difficulties with the cooperation.

Conclusions/ lessons

Cooperation:

The case study of the Dordogne conforms much of what we already know in the Netherlands about public participation and cooperation. The realization hereof strongly depends on individuals (connectors, mediators) who have to be able to operate in a positive environment. Of governments cooperate appropriately, they will be able to communicate jointly in a good way with the public. Then it can also help to organize meeting and present dilemma's with GIS for example.

As soon as a region is functioning appropriately it will be seen as an example and there will be spoken of institutionalization. The European Water Framework Directive seems to have triggered this, and the 'dordogne model' is not copied one on one – as you can't make a network responsible for something – and the appointed institute became the Agence de l'Eau.

Floodmanagement seems to be seen more and more as a separate problem, at least when it comes to the risk management approach. Personal responsibility combined with subsidies for measures and with a solidarity levy and insurance where the remittance depends on the taken measures. Striking is the central role of the mayors, and you could wonder if they can handle it. Europlano shows that the safety doesn't improve everywhere.

Financing:

Upstream retention is hardly been succesfull (Europlano), but it seems that through the settlement constructions they are trying to reach a breakthrough.

Sources:

- Public Participation in the Dordogne River Basin Case study report produced under Work Package 5 (Harmonicop, Bernard Barraqué ea) 2004
- Website CEPRI Centre Européenne de prévention de risques d'inondation
- Guide RALENTISSEMENT DYNAMIQUE prévention des inondations
- Europlano II rapport (RIZA 2006)
- http://www.cepri.fr/cgloiret/pp_programme_europeen.htm
- http://www.vie-publique.fr/decouverte-institutions/institutions/collectivites-territoriales/definition/

GERMANY – NORD RHEIN WESTFALEN: WUPPERVERBAND

The case

The Wupper joins the Rhine in Cologne. The agency responsible for the water management is called the Wupperconnection. The Wupperbond (one of the present Wasserconnections) was set up a long time ago to give the basinarea of the Wupper (Ruhrarea) a good ecological status, to clean it, prevent floods and low water management.

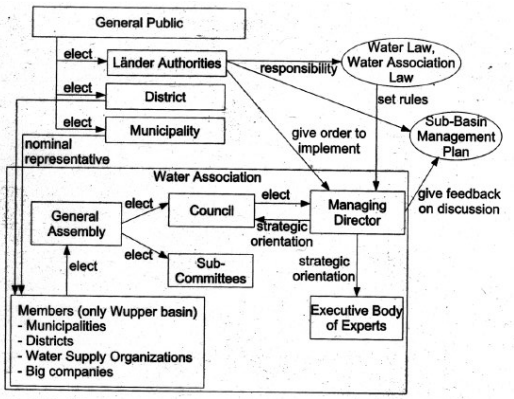


Fig. 3 The Wupper management. Source: own presentation.

The functions of water management are divided between the federal government and the federal länder. The federal government is authorized to make the legal framework for the federal länder. Making them the layer for KRW-participation. The federal länder are responsible for allocation of water, including the federal laws, and thus form the executive power in water resources management. Realization of the water resources regulations is the only responsibility for the federal länder and the municipalities.

In general the federal role is limited; the implementation of the KRW is “passed on” to the Länder. These also organise the public proces. How they do that strongly diverts; in NRW the Wasserconnections are brought in. Water inconvenience is almost totally arranged by Land. Recently the environmentminister made 40 mln euro available for hochwasserschutz. Europlano II shows that in 2005 NRW did not have a formalised system for transparancy and responsibility for risks.

Research questions	
Research questions	**Findings**
▪ **How does the Wupperconnection work?**	Wupperverband is één van de 9 “waterschappen” in NRW, die wettelijk zijn ingesteld maar wel allemaal een andere historie hebben (Wupperverband was de eerste in 1930 en vormde een voorbeeld). De uitvoering van het waterbeleid is in NRW doorgedelegeerd naar deze organisaties, met het Land als toezichthouder. (Dem Ministerium für Umwelt und Naturschutz, Landwirtschaft und Verbraucherschutz (MUNLV) obliegt die Oberste Rechtsaufsicht über die Wasser- und Bodenverbände nach dem Wasserverbandsgesetz des Bundes (WVG).) Verplichte leden zijn: gemeenten, districten (Bezirk), industriële gebruikers, waterproducenten. De Algemene Vergadering heeft ruim 100 leden. Het Wupperverband is een openbaar lichaam waarbij de vervuilers en gebruikers van water zijn verplicht lid zijn. Het Bundesland ziet toe. Ondanks indirecte democratische vertegenwoordiging is de participatie langs informele (of niet-gereguleerde) weg naar

	tevredenheid. Er is geen reden om aan te nemen dat dit systeem slechter of beter functioneert dan de onderzochte Nederlandse case HDSR (Stichtse Rijnlanden). Er ontstaan nu discussies of de informeel gegroeide samenwerking met ecologische stakeholders niet geformaliseerd zou moeten worden (bijv. visserij, en water recreatie/sport).

Deepening of insights on theme's	
Theme's	**Findings**
▪ **Participation and awareness**	Simiral to the Dutch situation the inhabitants in the surroundings of the Wupper have less and only indirect influence on the discisions made in the Wupperconnection. Because they can't directly choose respresentatives for the water organizations themselves. Even though the Wupperconnection is not responsible fot the European Water Framework Directive (KRW) it did adjust its management strategy. At the moment it takes the whole water system into account, including ecological aspects. Because ecology is also becoming a steering principle water might not be seen as a utility good anymore but more as an entity with absolute and independent interest. The Landesministerium has a good website about participation. A document with dilemmas for water management (to which Wupperconnection contributed) will be presented to the population for 6 months starting 22 / 12 / 07. Wupperconnection sees this process as a way to gain support of the members for the choices that have to be made through the grassroots level.
▪ **Regional cooperation**	A paradigm shift took place enabling the Wupperconnection to play a connecting part between water players and the general management (municipalities that are also members). Research shows that within the bureaucratical context social capital can be built up and a context can arise for a paradigm shift (to ecological goals) to occur for which the membership is actually not built up to. Other parties are being included in the processes without any legal obligation existing. Possibly this works well because the general assembly and board is composed of professionals that are appointed by the members, that need to be connected. Another possibility is that there is a lot of low hanging fruit – ecological objectives are possibly les controversial or expensive. These are however speculations.

▪ **Water and spatial planning**	(Rhine basin) regulation for floodrisks exists for regional planning. This is however not attuned with the general regional planning for for example the height of the entrance to the buildings or the realization of the HAZARD maps or information material for public awareness for floods. Next to this a change in the way of payment for sufferd damage by floods must be reviewed between regions and municipalities.
▪ **Financing**	Het Wupperconnection is sustained by membershipfees from polluters and water users. The amount of the contribution is decided on the basis of use / pollution, and this also determines the voting right in the general assembly.

Conclusion/ lessons:

- Cooperation between water stakeholders and general management can be reached through a formalized form of cooperation (depending on social capital / culture; but indirectness could also lead to more professionalism).
- Arranging joint participation in a bigger basin area can help the participating organization create support for their own choices; and can work without being legally prescribed.
- Participation by presenting dilemmas instead of proposed choices.
- Paradigm shift to a more integrated approach can be reached bottom-up.

Sources:

- Project IRMA – SPRONG 5: spatial planning and supporting instruments for preventive flood management.
- Implementatie KRW in het Nederlandse Maasstroomgebied Bilateraal overleg en samenwerking met Vlaanderen, Duitsland en Wallonië.
- NRW zahlt 40 Millionen furHochwasserschutz – Viel sanierungsbedarf (dpa Meldung)
- Assessing framing of uncertainties in water management practice. Nicola Isendahl, Art Dewulf, Marcela Brugnach, Greet François, Sabine Möllenkamp, Claudia Pahl-Wostl
- Institutional elements for adaptive management regimes. Comparing two regional water management regimes in the Rhine basin. Sabine Mollenkamp, Machiel Lamers, Eva Ebenhoh. In: Adaptive and integrated water management. Coping with complexity and uncertainty Eds: Claudia Pahl Wostl, Pavel Kabat, Jorn, Moltgen (eds.) Springer
- www.flussgebiete.nrw.de

ENGLAND – FLOODING

The case

Flooding is currently high on the agenda in the UK. The Environment Agency has overall responsibility for fluvial and coastal flood risk in the UK. It is funded by government through the Department of Environment, Food and Rural Affairs (Defra). Interesting to note that there is no reference to floods in the name and Defra are subject to many other funding pressures, such as foot and mouth disease and avian flu. The Environment Agency has, what is termed, "permissive powers" in that they are under no obligation to provide defences and no one has a right to be defended.

Current issues in flood risk management

The 2007 summer floods highlighted the importance of sewerage/drainage systems in a study of risk as floods occurred not only because of fluvial flooding (high discharge of rivers) but also because of surcharging of sewerage/drainage systems. For example, surcharging of the systems lead to extensive flooding in Hull; the Tidal Surge Barrier and the associated defences on the Humber Estuary and the River Hull protected the city from a surge in the North Sea. The sewerage/drainage systems are the responsibility of the water and sewerage companies. These are private companies that are regulated by The Water Services Regulation Authority (OFWAT). The annual charges for water and sewerage services are set down in advance every 5 years, together with the programme of work that must be undertaken. This combination of public and private funding is a major obstacle and a number of pilot studies in high risk urban areas are underway to identify how best to proceed. The government's report[1] on the summer flooding has just been issued and amongst other things it recommends that the local authorities should lead. This is slightly surprising as the local authorities currently only have responsibility for minor watercourses.

How best to deal with the flood risk in urban areas is the subject of much current study/research. There are technical challenges in that the sewerage systems are designed to lower standards then flood defences. There are also process challenges in that there is a need to bring together a number of public and private organisations to develop integrated solutions. The water and sewerage companies are concerned about the flood risk to their assets, such as treatment works and pumping stations. A number of them suffered significant damage during the 2007 event. The companies are now undertaking studies to identify the risks and quantify the cost of mitigation works to all their assets, prior to the next 5 yearly cycle (2010 to 2015)

Another current topic is how to reduce runoff from catchments, through such measures as changes in farming practices, deforestation, etc. Pilot studies have shown that these measures are beneficial in small catchments but it is unclear if the benefits can be scaled up to larger catchments.

A further subject under discussion is how to reduce the impacts/damages of floods on properties, through what is referred to as resilience measures. Defra and the Environment Agency commissioned a study[4] of such generic measures, including initial costing.

Studies undertaken by the Environment Agency have shown that it is not economic to continue to protect some developed areas. Whilst the residents do not have a right to protection, the legality of the Agency "walking away" from existing defences is not clear. In addition, there are H&S implications because such defences will fall into a state of disrepair and eventually fail. By contrast, it does not seem sensible to remove the defences and subject such areas to an increased risk of flooding. The Agency is presently formulating, what is called, an exit strategy for such situations.

Research questions	
Research questions	**Findings**
What is the impact of insurance companies on checks and balances in the water / spatial management field	ABI (Association of British Insurers) is a major pressure group, influencing among others the way government deals with financing flood management schemes. It is understood that now, much likely due to ABI pressure, no schemes with a less than 75year standard are being promoted by the Environmental Agency. ABI members also have influence through their insurance acceptance policy. Although stated by ABI that everybody is able to get insurance, this does not mean that everybody indeed has insurance - sometimes the premium simply may be too high.

Deepening of insights on theme's	
Theme's	**Findings**
▪ **Awareness**	Public awareness of flood risk has significantly increased in recent times. The 2007 floods were headlined in the local and national media for more than a week and the interest continues. For example, towns like Tewksbury and Gloucester were again at risk of flooding in mid January 2008 and featured in the main TV news, with comparisons to 2007. The Environment Agency's website allows anyone to view the 100 year floodplain for the whole of the UK. It allows a householder to quickly establish if their property is in the floodplain; all that is required is the postal code of their house. Legislation was recently introduced to make house sellers provide a vendors pack for potential buyers. Amongst other things, this deals with the known flood risk to the property. The driver for the above openness on flood risk is insurance. Whilst the Association of British Insurers (ABI) has stated that all householders will be able to obtain contents insurance, this was only done following a public debate and pressure from the government. However, the premium is directly related to risk in that those properties in the higher risk areas are subject to higher premiums. ABI define high as less than 75 years. The choice is slightly strange because it is not a return period used by the Environment Agency and their website only shows the 100 year outline.

	The Environment Agency provides flood warnings for fluvial and tidal events. No adequate warnings can or are given for sewerage flooding. Residents in the higher risk areas are provided with a free service called Floodline Warnings Direct. This calls their preferred telephone number and leaves a message when a flood is forecasted. The Agency regularly has advertising campaigns to increase the uptake of this service, which is surprisingly low in some areas. For example, only 6% of houses in the flood risk areas of Doncaster have signed up for the service. The Environment Agency also produces leaflets to inform the public how to prepare for floods. These include ones on what to do immediately before a flood and how to better protect properties in the future.
▪ **Regional cooperation**	The Environmental Agency is the major actor concerning fluvial/tidal flooding. It consists of a head office, specialized national services (e.g. National Laboratory Service), regional offices (8) and area offices (22). The sewerage/drainage systems are the responsibility of the water and sewerage companies. These are private companies that are regulated by The Water Services Regulation Authority (OFWAT). Regional Flood Defence Committees exist within the Environment Agency. The committees comprise representatives of the local authorities and appointed individuals from the area. Staff from the Environment Agency are excluded from being members but they obviously provide advice. The committees have to approve the capital and maintenance spending plans of their region. They do have the powers to raise local levies to finance schemes, which are unlikely to be funded by Defra through block grants. Internal Drainage Boards have responsibility for operating and maintaining the drainage infrastructure in large areas of flat agricultural land, such as the Fens in East Anglia. It is understood that these are funded by way of a charge on the farmers and residents. This is similar to Holland, although the infrastructure is confined to small drainage ditches and pumping stations. The river banks are owned by those whose land is adjacent to a watercourse. They are referred to as “riparian owners” and, in theory, they are responsible for maintenance activities and keeping the watercourse free from debris. In practice, this does not happen and the Environment Agency or the local authority will undertake this work.
▪ **Water and spatial planning**	The local authorities are the planning authorities and decide which developments in their areas can be executed. The Environment Agency is a statutory consultee in this process and comments on all proposed developments. The planning authority does not have to accept the views of the Agency and they can allow development in a flood zone, should they decide the benefits to the community outweigh the food risk. The planning authorities are required to undertake

	Strategic Flood Risk Assessments, which take into account flood risk in the allocation of sites. The allocation of land for development in high risk zones is permissible if there are no equivalent sites at less risk. Flood risk assessments are undertaken by a developer as part of any planning application. These consider in more detail all the flood risks to a site and the surrounding area resulting from the proposed development. Guidance on flood risk assessments is provided in PPS25[2]. It is interesting to note that the Agency requires new developments to be protected to the 100year level, plus 20% for climate change. Should such sites flood in the future, the owners have no comeback on the planning authority or the developer.
▪ **Public-private relations**	As stated above fluvial/tidal flood management is organised within the public water sector, while sewerage/drainage system flood management is organised through private water and sewerage companies. Depending on the size of water courses different organisations (EA, local authorities, internal drainage boards) have responsibility. For all investments cooperation of land owners must be sought. ABI is a major pressure group. It is interesting to note that Norwich Union, who are members of ABI, commissioned a company to over fly the whole of the UK and produce a digital terrain model. The model was used in conjunction with a coarse hydrological/hydraulic model to produce flood risk maps. The maps are not publicly available but are used by Norwich Union in their future planning. The fact that Norwich Union was prepared to undertake such work illustrates how seriously they view flood risk and how it might impact on their business in the future. Members of ABI are active in many markets overseas and are significant contributors to the UK's invisible overseas earnings. Hence, they are in a strong position in their discussions with government on flood risk and other matters. The Environment Agency must obtain value for public money and will only promote a scheme with the optimum standard of protection, namely that with the highest benefit/cost ratio. In the recent past, that has leaded them to promote schemes with standards of 50years. This is less than the 75 year standard which ABI seek and the 100year plus climate change standard for new developments.
▪ **Financing**	Defra funds the Environment Agency and the amount of, what is called, block grant varies annually. The amount spent on capital schemes is allocated by way of a national priority programme. The priority score for each scheme takes into account economics (cost/benefit ratio), social deprivation and the environment. The methodology is outlined in the Project Planning Guidance[3] and the supplementary notes published by Defra. The social deprivation score prevents the funding being biased towards the more prosperous

	areas, where house prices and, therefore, the benefits are higher. Two PPP flood defence schemes were awarded some 6 or 7 years ago. It is unlikely that many, if any, will be let in future. The exception is the Humber Estuary, where a large capital spend (£200m) is required to improve the defences on the estuary. Some of the criticism of the current PPP schemes is that the Agency is committed to spend on them for another 13 years, when their priority is not high in comparison to the schemes in the current programme. This effect is exaggerated during those years when the block grant is, or has not been, high. The deteriorating condition of the current assets is likely to shape spending in the future. All assets are visually inspected annually and given a grade in the range 1(good) to 5 (failed). There have been instances when grade 2 embankments have failed during floods. Subsequent investigations have shown that the embankments do not comply with current design standards. It is likely that this applies to most of the older defences and more failures are likely until strengthening works are undertaken.

Conclusion/ lessons:

- A key feature of UK flood management is that the public is not entitled to flood protection. Transparency is large - the public has easy means of finding out whether they are at risk. Through recent flood events public awareness has risen, but not all instruments available (Floodline Warnings Telephone) are used to the full extent. Insurance premiums are based on actual flood risk. It appears that although in theory everybody can get insurance, not all households are insured.
- UK is more used the actual occurrence of flooding than NL. Interesting research carried out to date is on flood resilience measures - how to reduce the impacts/damages of floods on properties
- It would be useful to more fully understand the role of ABI and how they are organised, and to learn their views on future flood risk and the implications for governments, competent organisations and the public. Contact with ABI has been made, interview can be arranged on short notice.
- On the financial side, the role and benefits/disbenefits of PPP may be of interest. Opinions in the UK on this are mixed.

Sources:

- Learning lessons from the 2007 floods - An independent review by Sir William Pitt. Interim Report, December 2007.
- Planning Policy Statement 25: Development and Flood Risk. Communities and Local Government, December 2006.
- Flood and Coastal Defence Project Appraisal Guidance. Ministry of Agriculture Fisheries and Food (now Defra), May 2001.
- Flood resistance and resilience; an R&D scoping study Defra and the Environment Agency, May 2007

Findings in this factsheets are based on the references mentioned above and opinions stated by flood risk management experts at Grontmij UK, during discussions in Leeds on January 18th 2008. An appointment

with the flood risk manager from the Environmental Agency had to be cancelled due to a flooding emergency situation in North-Western England on this date.

SWITZERLAND – KANTON ZURICH

The case

Confederaly there is a obligation for Kantons to make spatial “Directionplans” allowing them to transfer danger zones to municipalities. Citizens are insured by the Etablissements cantonaux d'assurance. These cover prevention as well as damage insurance. Because of climate change there is a upward pressure on premiums.

There are riskmodellingmaps for catchement areas, but no explicit link with upstream retention (Jurg Elsener). There is a common policy to prevent runoff, but it has several goals. Traditionally there is already a lot of attention for (af)foresting, but cities don’t contribute to that and for as far as know there are no forests or retention zones that are specifically protected for the prevention of water nuisance.

As for water quality that does not seem so special in Switzerland. Only recently water purification is being paid from pollution levies. It is strongly connected to combating emissions and making sure there is a minimum turnover.

Research questions	
Research questions	**Findings**
▪ **How is flood management arranged in Zurich?**	Zurich is 1 of the 19 Kantons with obligated damage insurance connected to spatial plans. Municipaties are obliged to link preventive measures to dangerzones (approval of the Kanton is needed). Remittance of insurances depends on the measures that have been taken. Plans have a participative public process; citizens that find that municipalities don’t take sufficient measures can apply for subsidy themselves to take measures for their own houses. Flood protection is an expropriationtitel; municipalities also have to compensate planning damage. In Kanton Zurich, all owners of buildings have a compulsory insurance against natural hazards, including flood risk (offered by Building Insurance of the Canton of Zurich). Flood hazard maps, linked to binding spatial plans at Kanton and all lower levels of government, form the basis of insurance policies. Red and blue are the most risky zones. Owners are obliged to take reasonable measures against flood damage, which are to be determined by the gemeinde (municipality). In case of damage, the owner is insured and the size of payment is based on the hazard zone and presence of adequate preventive measures. The population should participate in the determination of flood hazard zones, which the municipality can influence by it own measures, since these zones will determine their residual financial risk. If citizens believe

	a municipality does not take adequate measures, it may claim ist assistance in payment of measures on their building. (This may be the case in existing buildings in the most flood prone zones with the most protection deficit, „red and blue“) Municipalities may expopriate land and buildings if that is required for flood protection of other buildings. They should financially compensate those owners, also land owners who face a diminishing of the value of their property as a result of hazard maps. Hazard maps become binding after proposed by the municipalities and approved by the Baudirection (the building management, an authority at Canton level). The municipality and the insurance company both may require owners take preventive measures on buildings, within a reasonable time limit and at reasonable price. This may be required as preventive measure or after a flood. This concerns especially sensitive or expensive buildings. Once all required measures have been taken, the insurance remunerates all damage in any hazard zone. Land owners are to be informed about the hazard maps by the municipality. No government has to pay the damage caused to owners if their buildings or land are located in the red zone.

Deepening of insights on theme's	
Theme's	**Findings**
▪ **Participation and awareness**	Through the spatial planning process wherein communication about risks takes place and a strong personal responsibility for measures and awareness is enlarged.
▪ **Water and spatial planning**	Water policy is effect oriented policy that is transferred to the local management through spatial plans.
▪ **Public-private relations**	The private role is limited. Insurances are private in some Kantons or private reinsurance takes place.
▪ **Financing**	Municipalities and citizens have to pay for measures themselves. If citizens are not satisfied the can apply for subsidy themselves.
▪ **Integrated water policy**	In 2006 quality and quantity where brought together in one confederal authority. l'Office fédéral des eaux et de la géologies (OFEG) was responsible for quantity and l'Office fédéral de l'environnement, des forêts et du paysage (OFEFP) was responsible for quality. They have been integrade in the Office fédéral de l'environnement (OFEV). The new division « Prévention et risques » is responsible for climate change, which is at the moment being connected strongly to risk management. It is not known if at kanton level this integration is also applied. There is a bit discrepancy. Energy companies have an important role because they manage water storage lakes.

Conclusion/ lessons:

When it comes to quality policy Switzerland does not seem very interesting or leading. As for risk policy Kanton Zurich has a transparency system that is similar to that of France. From the sources it is not possible to say is Swiss culture (direct democracy) is of influence.

It seems interesting if insurance premiums take responsible behavior of municipalities and citizens into account. Do insurance companies look for risk diminishing policy upstream? It does not seem this way.

There is a confederal prohibition on new embankements aimed at preventing nuisance for the ecology downstream (art 37). This seems to provide major restrictions for urban expansion, raising questions. Does that really work? It has resemblance with the EU High-water directive.

Sources:

- Gefahrenkarte Hochwasser erstellt – was nun? Leitfaden zur Umsetzung der Gefahrenkarten Hochwasser im Kanton Zürich; Jürg Elsener Metz
- Project IRMA – SPONGE 5: Spatial planning and supporting instruments for preventive flood management
- Proefschrift Stefan Kuks
- Knoepfel Peter, Nahrath Stéphane, Savary Jérôme, 2007 . Matériel de cours de l'IDHEAP 8/2007. Chavannes près Renens: IDHEAP.ch. Te downloaden op: http://www.idheap.ch/idheap.nsf/vwBaseDocuments/IdActHomepage?OpenDocument&lng=en
- Flood Control at Rivers and Streams Obtainable from: SFBOL, Distribution of Publications, CH-3003 Berne, www.bundespublikationen.ch.
- http://www.parlament.ch/homepage/cv-geschaefte.htm?gesch_id=20023350 (Over hoe men water steeds meer ruimte is gaan geven: antwoord op kamervragen)

AUSTRALIA – MURRAY-DARLING BASIN

The case

The Murray-Darling Basin (MDB) covers more than one million square kilometers and is located on the dry inland plains to the west of the mountain range that runs down the coast of eastern Australia. Home to just under two million people, the region supplies much of the water used by another million in South Australia and generates approximately 40 percent of Australia's agriculture and pastoral production. Those three million people and various industrial activities use about 4 percent of the region's water resources. The other 96 percent is used by irrigated agriculture. This constitutes about two thirds of the nation's rural and urban water consumption. The MDB is just over a million square kilometers in size and has a diverse range of landscapes, ecosystems, land uses and climates ranging from the tropical north to the temperate south. It includes over 30,000 wetlands, eleven of which are listed under the Ramsar Convention of Wetlands of International Importance. Divided between the southern and eastern Australian states of New South Wales, Victoria, South Australia and Queensland and the Australian Capital Territory the MDB is subject to a federal overlay of six jurisdictions which provides an extra political dimension not found in any other major Australian river catchment. Despite the existence of a near century old inter-jurisdictional water sharing framework, since the mid-1990s there has been growing concern about continuing environmental degradation and declining resource security.

The Murray-Darling Basin is 3,430km long, drains one-seventh of the Australian land mass, and is currently by far the most significant agricultural area in Australia. The name of the basin is derived from its two major rivers, the Murray River and the Darling River

Murray-Darling Basin Initiative

The Murray-Darling Basin Initiative is the partnership between the governments and the community which has been established to give effect to the 1992 Murray-Darling Basin Agreement. The purpose of the Agreement (Clause 1) is *' to promote and co-ordinate effective planning and management for the equitable, efficient and sustainable use of the water, land and other environmental resources of the Murray-Darling Basin'*. The Initiative is the largest integrated catchment management program in the world, covering the watersheds of the Murray and Darling rivers, an area of over one million square kilometres.

Research questions	
Research questions	**Findings**
▪ **How does the system of tradable water rights work?**	The Murray-Darling Basin Ministerial Council is committed to water trading as an important component of the future economic and environmental sustainability of the Basin. Water trading officially began in South Australia in 1988, in Victoria in 1989 and in New South Wales in 1990. Only two kinds of trading exist – temporary or permanent. Temporary trade involves transferring some or all of the water available under water entitlements for the current season or an agreed number of seasons. Permanent water trade is the buying and selling of water entitlements and allows water

	to move to farms where it can be used for higher value production. It involves the transfer of the ongoing right to extract water for the term of the right. Because of drought and salinity problems, in 1995 the Murray Darling Cap was created. This puts a limit on the amount of water that can be taken out of the Murray-Darling river catchments at the 1993-1994 level of usage. While this decision was seen to be in the interest of restoring environmental flows, it had the effect of handling water to the market to manage and distribute. As a result water prices have risen and water users have begun trading water, resulting in those who are able to pay the most for it, having greater access. The result is that licenses are being sold at very high rates, while the amount of water taken from the environment has not decreased substantially. One of the flaws in the current trading system is the fact that there is neither a standardized terminology between States nor a simplified, nationally consistent approach to water property entitlements.
▪ **What are the effects on transparency of decision-making and water awareness?**	A properly functioning market for water entitlements allows each farmer to decide whether to use, sell or buy water at the market price. Of particular importance is also the fact that water trading allows water to move to sites where it can be used for higher value uses. Equally important, permanent water trading gives irrigators, as well as other water users, the opportunity to increase the flexibility of their operations.

Deepening of insights on theme's	
Theme's	**Findings**
▪ **Participation and awareness**	To coordinate the communication activities of the Murray-Darling Basin Initiative, a comprehensive Communication Strategy has been developed. Specific issues and needs were related to three key communication outcomes: 1. Information transfer and exchange. 2. Communication networks. 3. Involvement in natural resource issues. The Communication Strategy was developed with close involvement of the Initiative partners, and sought to directly reflect the issues and needs of key stakeholders in the Basin.
▪ **Regional cooperation**	Murray-Darling Basin Agreement: signed by the governments of the Commonwealth, New South Wales, Victoria, South Australia, Queensland and Australian Capital, with many departments and

	agencies involved. The purpose of the Agreement is ' *to promote and co-ordinate effective planning and management for the equitable, efficient and sustainable use of the water, land and other environmental resources of the Murray-Darling Basin*'. The agreement provided the foundation for the Murray-Darling Basin Initiative by putting in place a process for the effective management of the water, land and other environmental resources on a Basin-wide basis. In the relatively short period of time since it commenced, this process has resulted in substantive achievements. The Initiative is the largest integrated catchment management program in the world. Current Integrated Catchment Management arrangements have evolved away from government-centred, single-issue approaches to integrated approaches where the emphasis is upon community involvement and whole-of-system approaches to land and water management. ICM most differs between the States in the nature of legislative support for ICM and the administrative structures of resource and environmental agencies. However, they are all fundamentally based on the concepts of integration of community involvement, technical knowledge and organizational structure and policy objectives. Anno 2007: the Federal Government said that in the absence of co-operation from all states it would legislate to achieve a federal take-over. The Water Act 2007 (commencing in early 2008) will enable water resources in the Murray-Darling Basin to be managed in the national interest, optimizing environmental, economic and social outcomes. It establishes an independent Murray-Darling Basin Authority with the functions and powers, including enforcement powers, needed to ensure that Basin water resources are managed in an integrated and sustainable way.
▪ **Public – Private**	Australia has undertaken a program of far-reaching changes in the way the water sector is organized and managed, with an increasing role for the private sector. In 1994, the Council of Australian Governments (COAG) declared that "business as usual" in the rural water industry was not a viable option for irrigators or the environment. It was also largely accepted that water and sewerage services should be run commercially. The water and wastewater utilities in almost every major city have been corporatized. Only in a few cities have important services been contracted out. The rest of the services remain under state control, with the only shareholder being the state, or municipal, government.

Conclusion/ lessons:

Water management in Australia is changing. The increasing drought problems make it necessary to change the point of view on water management. In this respect the system of water trading is also subject of discussion. Reformation of the water trade system has priority in the reorganization process of Australian water management. Until now there is no national market for water trade. To accomplish this, first of all the state laws have to be adapted. The federal government attempts to have a federal regulation of law by 2011 for Australia as a whole. In July 2007 the Federal Government said that in the absence of co-operation from all states it would legislate to achieve a federal take-over, but the Victorian Government has declared that it will challenge this in the High Court. Legislation to create the Murray-Darling Basin Authority was introduced into Federal Parliament and was passed in both the House of Representatives and the Senate in August 2007.

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UNITED STATES – NEW ORLEANS

The Case

New Orleans is part of the southern state of Louisiana of the USA, in the delta of the Mississippi. Founded in 1718 the city has been hit by floods several times, caused by hurricanes and extreme discharges from the Mississipi. Hurricane Katrina was one of the 15 hurricanes in the hurricane season in 2005, with extreme consequences: about 80% was flooded.

The Netherlands is situated below sea level just like New Orleans and is threatened by high water from the sea, rivers and lakes. A similar catastrophe like Katrina could take place if the dikes would collapse in the Netherlands.

Deepening of insights on theme's	
Theme's	**Findings**
Participation and awareness	In the USA several disasters (earthquakes, blizzards) take place and policy needs to be made. In the USA the policy is aimed at evacuation (evacuationplans are thought out in detail: evacuationsigns are placed along the highways) everybody is aware of the risks. In line with this there is a hurricane preparedness week in the USA every year. During the week attention from the citizens is asked for the risks of nature, like storm surge, hard wind, hurricanes and floods. The (participation in) flood insurance also contributes strongly to the level of awareness: people learn about the risks of the specific locations where they live. 'Insurability of flood damage' (so paying premium) seems to be a good concept for raising awareness.
▪ **Regional cooperation**	Corps of Engineers (federal organisation) plays in important part for the management and development of infrastructure. The Federal Emergency Management Agency (FEMA) is responsible for evacuation plans. There is however managerial fragmentation. The States have a lot of freedom for their own interpretation and policy is mainly aimed at state interests and a lot less at national interests. Next to this in various states 'tribal issues' also play a part (social minorities have territorial right related to spatial planning).
▪ **Public – Private**	The concept of public/private cooperation in the USA incorparates about the same as in the Netherlands. There is no joing policy development, at the most this occurs when private companies contribute as a sponsor, with joint research with universities for example.

	Next to this a 50/50 arrangement dating from 1985 exists, budgets granted by the federal government to the States should be paid for 50% by the federal government and 50% by local parties. Private companies can contribute to this.
▪ **Financing**	The federal governement in the USA stimulates the development of coastal plans by providing funding for plan making (maximum 2 years). If the plans are approved (if they coincide with the federal standard) then the states are entitled to money. However for the budgets that are granted per state this is different. The amount mostly depends on the lobbying skills of the senators. Rich States are less dependent on the federal government then poor(er) states leading to a lot of tussle. Next to this budgets are granted ad hoc. As such the situation can arise that there is budget for the development of policy, but in a later stage the budget can be insufficient for the execution of the same policy.

Research questions	
Research questions	**Findings**
▪ **Wat is the role of Federal government?**	Local government and the States are in the first place the organizations to take action when a disaster occurs (as they have the specific knowledge on the citizens and developments of that area). The federal government plays a supporting role. They only take action when the States give a signal that help of federal government is needed.
○ *Support for the insurance fund*	The federal government of the USA has started a National Flood Insurance Program (NFIP). This is a fund wherein people that live in a high-risk area (hurricanes, floods etc.) have to donate money every year and when a disaster occurs the get disbursed. To qualify for the insurance, you have to completely comply with the building regulations. This applies to both existing buildings as new buildings. The municipality observes if compliance with building regulations takes place. Before damage-remittance takes place, it is checked if the municipality has kept an eye on compliance.
▪ **How does the choice to focus on limitation of consequences of a flood result?**	The flood risk approach in the USA an in the Netherlands is different. In the USA is mostly concerns flood plains with a 1:100 flood chance. The Dutch policy is very much aimed at prevention, while the USA is more aimed at evacuation. The higher appraisal of the chance to prevent a flood in the USA makes people remember it more: automatically increasing the risk awareness.

▪ **How has the chosen role division led to problems with Katrina?**	Because of the different interpretation of several states and the fragemented way of budgetting managerial fragmentation exists. This has a negative effect when a disaster occurs, because tasks an responsibilities are not clear. During Katrina there was no designated organization that took the overall coordination and because of the lack of communication the degree/seriousness of the situation was not clear in first instance.
▪ **What is the meaning of Stewardships?**	Water Stewardship has not been made concrete in the USA as of yet. It seems that it is only used to put the water chain in a certain perspective.

Conclusion/ lessons:

The main difference with the USA seems to originate from the flood risk approach, in the Netherlands the policy is aimed at preventing a flood, while the policy in the USA is aimed at limiting the consequences of a flood. That is why in the USA much attention is paid to informing and education of people on what to do when a flood occurs. Detailed evacuation plans and brochures on what people can do themselves (for example taking care of pets, having enough water stored, batteries etc) exist. A lesson for the Netherlands could be to increase the awareness of flood risks with citizens and with that point out ones one responsibility.

Next to this Katrina offers the possibility to learn from the workings of insurance and specific evacuation oriented policy. During the reconstruction that is still taking place, lessons can be learnt about what works and what doesn't work.

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