



## **Submission Document – Andes Project A3**

Basin Development Challenges of the CPWF

December 2009

## **1. Basin Development Challenge:**

**ANDES: BENEFIT-SHARING MECHANISMS TO IMPROVE WATER PRODUCTIVITY AND REDUCE WATER-RELATED CONFLICT IN SELECTED BASINS [\[i\]](#)**

## **2. Project:**

Project A1a: On designing and implementing benefit-sharing mechanisms :

## **3. Project Data**

*Duration:* 4.0 years

*Target start date:* January 2010

*Finish date:* December 2013

*Maximum budget requested from CPWF:* USD 800,000

*Any matching funds offered (provide brief explanation):* not accounted

## **4. Project Deliverable**

1. Identifying which benefit sharing mechanisms (BSMs) work best under which conditions and why for anywhere in the Andes.
2. Developing BSM strategies to widen choice at a series of defined small basins.

## **5. BDC Goals to which the Project will contribute**

Basin stakeholders will have new opportunities to care for and reap the advantages of their local water and soil resources, leading to improvement in their livelihoods. Conflict between water and land users will have been diminished through the development and implementation of fair and equitable water and land reallocation mechanisms and rights. The resolution of such land-water use conflicts will contribute to improving the livelihoods of stakeholders. Local and regional governance will also benefit because resources and efforts can be redirected to other urgent problems. Social organization will become more inclusive and focused to deal with peoples' demands in closer contact with policy-makers at local scales. Finally, downstream water users will have a more abundant and reliable supply of clean water while upstream communities will benefit from investments that improve the productivity of their agroecosystems. In return, upstream communities will agree to cease the unsustainable exploitation of catchment areas key to downstream water supply. The project will contribute to the achievement of these goals through the provision of high quality and focused analyses to characterize the sources and sinks of water -related environmental services and to define strategies that manage these in pursuit of broader benefit sharing.

## **6. Links with other projects in the Basin Development Challenge [\[ii\]](#):**

The project will need to work with other projects in the BDC to contribute to a coherent research program that is lead by a Basin Leader, in particular we will work alongside A1 and, A2 and A4.

## **7. Project Summary**

This project is about institutional change. It is about identifying which benefit-sharing and coordination mechanisms work best under which circumstances for basins anywhere in the Andes and the reasons underpinning failure or success in specific basin instances. Through connections with the other Andes projects, it is also about developing strategies to widen the range of available BSM and accelerate the pace of innovation in the planning and use of such mechanisms. It is about providing a common platform - a negotiation support system - as a means of informing the BSM negotiation process with the best available knowledge.

The project will seek to identify the variables that need to be taken into account when BSM are designed and proposed as ways to curb rural poverty and environmental degradation. Variables that are especially critical to success will be highlighted. The possible effects of global change on these variables will be analyzed, along with the likelihood that changes in these variables will impact the viability of BSM. Finally, adaptations to BSM that may help them accommodate global change will be explored.

## **8. Links to previous and ongoing work**

### **8.1 Previous and on-going work**

We argue that the development of Benefit Sharing Mechanisms (BSM) is essentially a negotiation process resulting in a transaction among collaborating parties. While this may seem overly commercial when applied to the management of Andean water resources, a desire to share benefits arises from the recognition by stakeholders that the situation in a particular system could be improved if some alternative water management regime was established. A key feature of the proposed project is that we recognize that while BSM arrangements in the Andes have focused heavily on alternative agricultural land management practices, there is enormous scope to expand the potential benefit pool by including alternative water system arrangements in the analysis as well.

Based on our collective experience in land and water management assessments we are convinced that the identification and implementation of alternative management regimes follows the negotiation and transaction model. In the land and water management sectors this model should consider factors related to: (i) the legal and policy context; (ii) economic factors; (iii) physical constraints and opportunities; and (iv) social equity. We have experience in each domain. Relevant experience from outside the CPWF includes the following projects, relevancy being noted by the parenthetic notation (i: law and policy; ii: economics; iii: physical science; iv: social science).

### **King's College, University of London (KCL)**

- (iii) Hydrological and economic impacts of converting tropical montane forests
- (iii) Impacts of land use and climate change on pan-tropical water resources
- (ii) Costing Nature - valuing the water and carbon in the world's protected areas
- (iii) Global crop and water productivity estimates derived from remote sensing
- (iv) Challenges to Managing Ecosystems Sustainably for Poverty Alleviation: Securing Well-Being in the Andes/Amazon

### **Stockholm Environment Institute (SEI)**

- (iii) Assessing the Impacts of Climate Change on Mountain Hydrology: Development of a Glacier Change Methodology through a Case Study in Peru
- (iii) Developing a Conceptual Model to represent high elevation moorlands (páramos) in hydrologic models of Andean Watersheds
- (ii) Sharpening Drought Plans by Considering Climate, the Watershed, the Regulatory Environment, and the Forces of Change
- (i) Crafting a Legal Framework on Liability and Compensation for Climate Damages

### **Colombian National University (UNAL), Palmira**

- (i) Assessment of the implementation of municipal development plans in Colombia.
- (ii) Costing water in Chingaza watershed for urban areas (Bogota).
- (ii) Costing access to water at the Andes scale as part of the Andes BFP-.
- (iii) Monitoring of water discharge in subbasins at the Amazon basin using remote sensing and in-situ measurements.
- (iii) Use of bayesian analysis for the identification of potential areas prone to erosion and productivity losses in the Andes Amazon interface.
- (iv) Social networks for water management at basin scale in Honduras.

While these external projects provide value-added for the CPWF, we recognize that the CPWF Phase 2 activities emerged from accomplishments under Phase 1. Collectively, we contributed to several relevant CPWF projects and broader activities, which are summarized below.

#### Projects

PN 15 used social networks to analyze links between institutions and water issues and tracked the relevance of water constraints on creating local organizations.

PN 20 built capacities of local communities for dialogue and negotiation with more powerful organizations.

PN 28 implemented multiple-use projects creating access to water for domestic needs and vegetable production; established Learning Alliances to work towards scale up.

### Broader Activities

The Extrapolation Domain Analysis for the Impact of CPWF Projects produced a tool to extrapolate localized efforts based on geographic, institutional and willingness to participate indices.

The Mekong BFP generated a basin-wide water model using WEAP, complimented with livelihood models, to assess the potential impact of land cover change and water infrastructure development on water productivity and livelihoods.

The Andes BFP provided a baseline analysis of water access, water productivity and poverty under current conditions and expected future climate and land use trajectories along with policy support system for improving water productivity throughout the Andes. End users of this PSS have indicated that access to this knowledge platform - unsurpassed in detail, relevance and ease of use - for the Andes has been a significant step forward in bridging scientific data with the needs of water managers in the Andes.

### **8.2 Lessons learned**

Whilst there were numerous specific lessons learned from this work, the challenge here is to distill these into the key lessons relevant to the development of sustainable BSM. Foremost is that the allocation of costs and benefits associated with water management is a complex, often politically charged process. In the absence, of good information this process can be held hostage by rigid positions that cannot be reasonably evaluated. A transparent process of developing and providing knowledge and tools to explore the implications of various water management arrangements can remove this hurdle if the tools used are deemed relevant to the negotiation. This is particularly true in watersheds as socially and hydrologically heterogeneous as those in the Andes. The Andes BFP invested heavily in providing access to decision-relevant data and tools by drawing on KCL's long experience developing spatial policy support systems of the impacts of land management and climate change on water productive areas. These systems are already being used, by TNC for example, in the negotiation of BSM. SEI improved its water resources management modeling platform, the Water Evaluation and Planning (WEAP) system, by developing new glacier and páramo modules for Andean hydrological analysis. The project team is well placed to develop decision relevant information to support BSM negotiations.

This is not to say the scientific analysis will produce the answer to which all parties agree, but knowledge of the distribution of water demand and supply and the impact of global change and human interventions can allow negotiations to shift to the significant questions of equity and compliance that are at the heart of a negotiated BSM. A second lesson we have learned is that these fundamental issues must be negotiated in a transparent and inclusive manner. If parties feel left out of the process, they are unlikely to approve of any proposed arrangement. The possibility of perceived exclusion is exacerbated where one party's position in a watershed provides an information or hydrologic advantage relative to other parties and where there are disparities in the level of power and capacity between parties. Also, the parties involved must truly represent their constituencies, otherwise

compliance can be difficult to enforce. An enabling legal and regulatory framework is also essential to the development of BSM, the promotion of which is within the capacity of the project team.

In response to these lessons we pay attention to the socio-economic dimensions of inclusive negotiations. We have worked close to local organizations to understand the actions that build up the basic skills of local communities to participate in the decision making process. The Andes BFP developed databases that assess institutional readiness for participation in the identification and implementation of water management innovations. Combined with the biophysical and policy support expertise of KCL, the water management expertise of SEI, the agricultural and hydrological expertise of UNAL and other local Universities, we are well placed to respond holistically to the BDC in the Andes.

### **9. Research questions**

The following are the research questions that this project should address: In the Andes, (1) how did existing and planned BSM emerge and evolve? Based on these experiences, and CPWF Phase 1 research:

(2) Which are the most important categories of BSM?

(3) How should locations be chosen in designing and implementing BSM?

(4) How are BSM best negotiated?

(5) Under what conditions (political, institutional, environmental, and technical) are they most likely to be successful? What are reasons for success or failure?

(6) How might global and regional trends affect BSM performance? What adaptations to these trends might be used?

*How will your research address these research questions?*

(1) Our experience is that Andean BSM emerge when advocates of BSM, often international conservation organizations and in-basin urban and industrial water users, encounter rural communities willing and able to engage in a negotiation process to improve water resource management. The actual content of BSM transactions can vary depending on the setting within which they are negotiated. The process is often *ad hoc*, however, and our research is designed to create a spatially-targeted and locally-adaptive template for BSM in the Andes by providing locally relevant knowledge and systems for negotiations in any basin in the Andes.

(2) We define two primary BSM categories in the Andes. The first involves enhanced compensation for the adoption of best management practices in the hydrologically sensitive portions of a watershed, reducing the likelihood that under-performing practices will expand into sensitive hydrologic settings to the detriment of the provision of downstream ecosystem services. In this category, parties from across the globe, motivated by a sense of global stewardship and related to the upstream interests via a commercial exchange bound to the water use of agricultural commodities, may also contribute to enhanced compensation leading to the adoption of best practices and the reduction of negative

downstream impacts. Both of these will be incorporated into our negotiation support systems for application inside and outside the CPWF basin.

A second category occurs where an upper basin party does not adequately internalize the cost of avoiding detrimental reductions in downstream ecosystem services. This may be the case when a significant amount of flow is depleted and or transferred out of a system high in the watershed or when an activity leads to degradation of downstream water quality. Responses to this situation are often structured around attempts by downstream interests to impose regulations on upstream parties, a process fraught with legal and political uncertainty. By reducing this uncertainty, informed BSM can provide resolution to an otherwise confrontational process. Simply putting the best available spatial information together in an open and transparent analytical tool that requires no significant capacity to use can substantially support negotiation processes and enhance the rate of BSM adoption.

(3) Viewed through the lens of our proposed research outcomes, we will look to represent both BSM types in our choice of implementation locations. We have identified locations where there is a level of trust in the value of BSM and the capacity of relevant institutions to carry it out. These locations were identified through contacts in our collective professional networks. Another factor that guides the choice of a location will be the availability of information. As good data are costly and time-consuming to gather we will draw heavily on the emerging body of analysis that we have already conducted or to which we have access via our professional networks. Taken together, these factors (typological representation, proper context, personal experience, and the relative availability of information) guide the discussion of site selection presented in Section 10.8

(4) BSMs rely on trust. Trust is associated with transparent decision making processes which include the use and dissemination of credible information, the use of evidence to support inference and policy, and credible simulations to anticipate potential outcomes of change. Sharing the control of the process with local water users and beneficiaries increases the durability of actions. It is worth noting that among key stakeholders in the locations we will work, some level of trust in the BSM process is already in place.

(5) The inequitable distribution of resources is associated with unbalanced power relationships. Any context in which power relations are balanced will be more likely to achieve successful implementation of sustainable BSM. If this balance does not exist, it must be created through capacity building, open access and inclusivity. The generation of economic incentives is a driving force for collaboration: a business case for BSM must thus be made.

(6) Global trends include climate variability and change, fluctuations in market prices for crops, energy, fertilizers and population changes. All of these have the potential to affect BSM performance. BSMs need to be developed with knowledge of these potential changes in order to understand the future of water demand and supply. Careful analyses will be needed to avoid negative impacts of changes in market forcing in order to design BSM that can be sustained.

## 10. Research Outputs, Methods and Uptake Pathways

### 10.1 Project research outputs (from MTP)

A conceptual framework to guide institutional reform (at all scales) regarding the planning and implementation of BSM.

*What additional research outputs should the project produce, if any? What does the output(s) add to the BDC?*

This research is about providing information and building capacity to support the initiation, negotiation and ultimate adoption of BSM through (i) an Andean scale BSM opportunity prioritisation and feasibility analysis and (ii) the provision of negotiation support tools for local BSM negotiations in any Andean basin (providing all required data with the tool) and for specific Andean basins incorporating water management aspects and the outcomes of BSM. We propose to work in at least four, perhaps five, basins as described in Section 10.8 and we will call these the CPWF basins). We anticipate that regional scale research outputs will provide stakeholders and decision makers with information on the existing, proposed and potential for BSM opportunities throughout the Andes. Since end-users will need highly specific information for any Andean basin (not just the CPWF basins) we will ensure that the negotiation support tools is applicable to any Andean basin (supporting at least part of the negotiation process). Basin scale research outputs developed in the context of specific water systems in the CPWF basins only will provide information to support the full negotiation process. At both levels, social, political, institutional, environmental and technical factors must all be considered in the BSM identification and negotiation process. In the absence of either (i) an enabling policy and regulatory environment at the national and international level or (ii) the successful application of economic analysis, scientific analysis and social analysis, negotiations in pursuit of BSM will not be transparent, widely accepted, nor sustainable.

Our project intends to carry out each category of analysis in support of regional and site-specific BSM identification and negotiation processes. In conducting these analyses, we anticipate that we will produce the following outputs:

1. Four or five site-specific assessments of the potential effectiveness and impact of various land and water management BSM strategies and a validation with respect to impacts on rural and peri-urban agricultural development in our proposed research locations.
2. Comprehensive documentation of all steps taken as part of historic BSM negotiation processes, including an assessment of what worked and why.
3. As part of regional and the site-specific assessments, a negotiation support system (The AguaAndes NSS) – unsurpassed in local relevance and detail - to support the identification and ultimate implementation of land management and conservation BSM through empowered, evidence-led negotiations. The starting point in the NSS development process will be the AguaAndes PSS which emerged from the Phase I Andes BFP. This watershed process analytical platform will be usable throughout the Andes at coarse and fine scales without significant user investment of data nor capacity. Using the



AguaAndes NSS as the basis, users will be engaged from the start in the process of identifying potential BSM strategies. Regional biophysical information in the new AguaAndes NSS will be complimented with contextual social, institutional and environmental information.

4. At the level of selected site-specific Andean basins, the AguaAndes NSS will be enhanced via the coupled development of WEAP applications focusing on simulating water management arrangements under different BSM in order to better support the BSM negotiation process in these specific water management settings. WEAP application development is already complete in two of the proposed site-specific locations, is planned for in a third, and will be completed in the remaining two as part of the proposed project. WEAP has been developed to capture not only the bio-physical aspects of a particular watershed, but to also allow for consideration of legal, institutional, social, economic and environmental considerations.
5. An extrapolation exercise based on secondary BSM information from the broader Andean region designed to scale up and contextualise the lessons learned in the site specific land and water management assessments.
6. Based on the aforementioned assessments, procedural guidelines on key principles for implementing particular water management BSM in the Andean settings.

While developing these outputs, we will focus on fostering empowerment through information and capacity building by reducing the hurdles to use the best available information towards BSM negotiation. To secure this capacity building we anticipate that we will support a regional Learning Alliance that should be set up and managed by Project A4.

## 10.2 Project partners

In the next five sections we describe the various outputs presented in Section 10.1 in more detail. For simplicity we have organized the outputs into four sets. Partner involvement is indicative of their leading the activity, trans-disciplinary and inter-institutional work will be fundamental.

**Negotiation Analysis Outputs:** KCL (product-embedded benefits), SEI (risk analysis and management); UNAL and LOCAL UNIVERSITIES (incentive design and valuation proposals in close collaboration with WWF).

**Science Analysis Outputs:** KCL (regional opportunity mapping); SEI, Local Universities (catchment hydrology and water resources systems); UNAL and other LOCAL UNIVERSITIES (site characterisation, social and biophysical current conditions based on secondary information).

**Social Analysis Outputs:** SEI and CIAT plus key contacts in sites through local partners; (legal framework), UNAL (institutional framework, gender and equity), LOCAL UNIVERSITIES in the selected sites (socio-political contextualisation).

**Linkage Outputs:** KCL, SEI, UNAL for capacity building, communications, knowledge sharing and dissemination in collaboration with A1b, A2 and A3.

### **10.3 Next users**

**Negotiation Analysis Outputs:** Farmers and crop associations, local and regional finance organizations, local environmental and agricultural authorities and the academic sector.

**Science Analysis Outputs:** International investors in environment and development, National Planning agencies, National and local environmental institutes and conservation NGOs, Crop associations, the academic sector.

**Social Analysis Outputs:** Transnational organizations such as CAN in the Andes, international funding agencies, National ministries for water and agriculture.

**Linkage Outputs:** Members of associated partners, individuals from selected sites, members of local authorities, universities, planning and environmental agencies, CPWF projects A1, A2 and A4.

### **10.4 Learning required by next users**

**Negotiation Analysis Outputs:** Resources valuation with emphasis on water, long term accounting.

**Science Analysis Outputs:** Understanding of systems approach to the study of water resources, basic spatial analysis techniques, use of online geo-browsing systems, testing of scenarios and policy options.

**Social Analysis Outputs:** Understanding of: international policies and regulatory frameworks, international conventions for natural resources management, market agreements, poverty and equity measurements and indicators, local regulations and water/land rights.

**Linkage Outputs:** Basic computer skills for Internet browsing and reading in native language.

### **10.5 Research methods**

#### ***Negotiation Analysis:***

Negotiation analysis will focus on the evaluation, negotiation and realisation of BSM schemes from a socio-political and environmental knowledge base. This includes negotiation of BSM between local consumers and providers as well as between local providers and far-distant consumers. The concept of virtual water trading (embedded in products that are traded with a premium on sustainability) will be explored as a market opportunity. Analysis will focus on the overall valuation of different potential BSM such that they can be designed in a manner that is likely to motivate sustained participation. The inherent uncertainty of BSM will be explored to define the financial risks associated with a BSM and

identify risk management strategies which are grounded in the current economic reality and which are likely to succeed.

***Science Analysis:***

Science analysis will focus on application of the Policy Support System (AguaAndes) developed by KCL as part of the CPWF Andes BFP and its transformation into a Negotiation Support System (NSS). The AguaAndes PSS can be used to identify important Andean watersheds in terms of their provision of downstream ecosystem services, both under current conditions and under conditions of future change in watershed conditions. This analysis will help frame the overall potential for BSM transactions throughout the Andes. The hydrological component of AguaAndes (the FIESTA model) is extremely detailed both spatially and in terms of process and is currently providing its sub-models for mountain hydrology to further develop other models such as InVest and SWAT. For specific basins a dynamic link between the WEAP software developed by SEI, and the web based FIESTA model will be developed to provide the best possible representation of the water availability, water demands, and water management systems associated with a specific negotiation setting.

***Social Analysis:***

Social analysis will focus on procedures for evaluating the degree to which an enabling policy and regulatory environments exist at the national and international level for the negotiation of BSM. In the Andean countries of Bolivia, Colombia, Ecuador, and Peru civil society mobilization for the recognition of water as a fundamental human right have emphasized the crucial need to secure equitable distribution of water for the improvement of human well-being. This analysis will focus on determining whether national laws in the Andean countries and the international obligations these countries have agreed to are consistent with this objective and the goal of expanding the scope of BSM. If not, the analysis will produce recommendations for policy reform.

Social analysis will also focus on defining conditions that will allow actors to effectively engage in the BSM negotiation process. One key effort will be on defining governance models that allow inclusive participation and representation through which different stakeholders come to play a role in crafting and monitoring policy. We will also analyse gender and social equity and possible adjustment of relations of power that limit access to and control over water resources by gender, ethnicity, race, economic status, or religion. Here we expect to work together with WWF to replicate the method in areas where they are not having direct action. The goal of this work is to define the terms that will promote voluntary participation in BSM in order to increase the likelihood of sustained compliance. Research methods will focus on participatory visioning and constraints analysis carried out at the local level in the defined basins.

***Linkage:***

The primary research method associated with the development of uptake facilitation and linkage will be the establishment of *Learning Alliances* that have been used effectively by past CPWF projects to facilitate the expansion of local scale learning. The Learning Alliance

process focuses heavily on documentation and the shared development of guidelines. We will also carry out research to explore different options for sharing information across the region. We anticipate that much of the effort required to set up and manage the Learning Alliance will be provided by Project A4, into which outputs from Project A3 will be introduced.

**Breakdown of tasks:**

Framed in the structure of a proposed work plan, these analyses will align themselves according to the following set of tasks.

(Task 1) An Andes-scale scoping study defining areas where particular types of BSM are likely to succeed with the following outputs:

- (a) A Web-hosted database of existing and proposed BSM water and agriculture related in the Andes (UNAL/CIAT).
- (b) Academic paper: on inventory and trends in BSM in the Andes (UNAL)
- (c) Academic paper: on reasons for BSM success/failure (UNAL)
- (d) Web-hosted short review report: analysing political and legal requirements for BSM (SEI)
- (e) Web-hosted short review report: analysing socio-cultural requirements for BSM (UNAL)
- (f) Academic paper: reporting biophysical requirements for BSM (KCL)

(Task 2) The development of a web-based negotiation support system (NSS) building on the AguaAndes PSS and providing a platform for analysing the potential hydrological and water resources impacts of various land management BSM mechanisms at the local scale anywhere in the Andes, outputting:

- (a) A web based NSS capable of application to understanding the impacts of BSM in any catchment within the Andes (KCL).
- (b) Supporting online documentation (KCL)
- (c) Supporting online training materials (KCL)
- (d) Outreach, user engagement and training (KCL)

(Task 3) The development of an intervention level NSS through live-linking the WEAP software to aspects of the web-based AguaAndes NSS to develop water management BSM in heavily managed water systems in the CPWF catchments, outputting:

- (a) Newly developed WEAP applications focused water management aspects of BSM and in partnership with stakeholders in the CPWF basins (SEI)
- (b) New routines to call the AguaAndes NSS to return water availability model results (1km or 1ha raster grids with a monthly time-resolution) as an alternative to inputting local data to WEAP for data or CPWF catchments where those local data are poor compared with AguaAndes outputs. (SEI/KCL)
- (c) Documentation, training and user engagement for application of the new tool. (SEI)

(Task 4) An analysis of experience and processes of negotiation of past and current BSM in the Andes with the following outputs:

- (a) Web-hosted report: review of questionnaire/interviews on negotiations for BSM (UNAL)
- (b) Web-hosted and paper-disseminated policy doc : procedural guidelines for the development of BSM : lessons for and from the Andes (UNAL)

(Task 5) Application of analyses, outputs and tools with end users to current and proposed BSM negotiations inside and outside of the CPWF basins, outputting:

- (a) Workshops and communications to engage with CPWF projects A1b, A2 and A3 (UNAL/CIAT)
- (b) Workshops and communications to engage with stakeholders at local, regional, national and international level (CIAT)
- (c) Delivery of project reports and tools (ALL)

### **10.6 Participatory research approaches**

This is an action research type of project; adoption is inherent to the experience gained during the practice of implementing or improving BSM in the selected sites. Lessons learned (both positive and negative) will spread throughout the Learning Alliance that will be set up as part of CPWF activities in the Andes. Knowledge and information will be shared by means of the specifically designed tools described.

### **10.7 Change in user practice**

We expect stakeholders addressing water management will make use of the BSM tools and guidelines defined during this project to facilitate the following : the practice of informed decisions, transparency, use of detailed, locally specific, and reliable knowledge and data, consideration of gender, equity and participation of parties involved in decision making processes.

Users will include in their investments and economic activities, factors and variables that were not considered before to understand and better manage water resources systems. This includes monitoring and assessment of interventions and their impact on the social, biophysical and economic realms. Moreover users will feel ownership through open and transparent access and thus contribute their own knowledge to this evidence base such that it grows and evolves beyond the life of the project.

### **10.8 Suggested sites**

We will work at two levels: on the one hand, the regional policy and negotiation support systems that we develop will be applicable broadly at the scale of the entire Andes and with more detail in **any** Andean basin in which the user has interest. This will be achieved using pre-processed data available from an existing database developed prior to and as part of the Andes BFP. This opens up the outputs of the project to a much wider range of BSM negotiations throughout the Andes. Secondly, we will work at greater detail in a series of basins where we will also have on the ground operations for institutional and socio-

economic analysis and data collections towards the application of the WEAP system (dynamically linked to AguaAndes where applicable). The suggested sites are defined below, after consultation with projects A1b, A2 and A3. It is possible that efforts in the La Paz/El Alto system will benefit from co-funding from other sources and the inclusion of this system in the table is somewhat dependent on this funding being secured.

WWF, Opción Putumayo, Nodo Quindicocha de la red de Reservas Privadas. Asociación Ampora: Encuentro de dos Ríos, Corpoamazonia, Comunidades étnicas

Country	Site	BSM Opportunity and critical Issues	Existing and Potential partners
Colombia	Coello - Combeima	Securing water for food and consumption, páramo preservation, non point source pollution, health.	WWF, Semillas de Agua, Universidad del Tolima, Gold mining enterprise, Ibaguè water suppliers, Coello and Saldaña Irrigation systems, rice producers association. Environment and Agriculture Ministries, Cattle ranchers, CORTOLIMA
Colombia	Alto Putumayo	Securing water for food and consumption, páramo preservation, non point source pollution, health.	
Bolivia	La Paz/El Alto regional water system	Integrate downstream objectives into the design of urban water management planning for post-glacier period. Urban water use by city of La Paz, agricultural use downstream of diversion to La Paz. Construction of additional reservoirs planned. Stated interest in the development of a WEAP application	EPSAS, PRAA (Proy. Adaptación al Impacto Acelerado de Glaciares en Andes Tropicales), Instituto de Hidráulica e Hidrología
Ecuador	Rio Paute	Páramo in headwaters, agricultural expansion, urban water use in Cuenca, hydropower production. Water fund launched. WEAP model developed	IRD, Hidropaute, PACC (Proyecto Adaptación al Cambio Climatico), Ciudad de Cuenca, TNC, FONAP
Peru	Rio Santa	Glacier melt with climate change / WEAP model developed. Hydropower production, managing upstream reservoirs for multiple use (i.e. Paron Lake conflict) downstream water diversion to irrigation districts.	Universidad Nacional Agraria de La Molina, IRD, Duke Energy, SENAMHI, Municipalidad de Huaraz, Proyecto Especial Chincas

## 11. Activities and Implementation Plan

*In the form of a Gantt chart, constructed as an Excel spreadsheet, are part of a project workbook.*

## 12. Communications and alignment with CPWF Culture

### 12.1 Communications

The project is expected to contribute to the following communications products:

- Policy recommendations for the successful implementation of the BSM considering different biophysical, socioeconomic and institutional environments
- An open access website and negotiation support tools with contributions from CPWF partners and stakeholders

*Briefly describe your communications plan*

Our communications plan has different strands, all of which are focused on a central point of communication at a dedicated [www.benefitsharing.net](http://www.benefitsharing.net) site which we own. Communications will involve all of the following:

- Direct engagement with stakeholders in the research locations (NGOs, development organizations, water managers, water policy makers, water users, farmers and cooperatives).
- A web-based project description
- Contributions to training and capacity building meetings organised by Andes project 3
- High level policy briefs
- Open access knowledge base and web based policy (negotiation) support system
- Conference participation
- Engagement with the media, particularly newspapers
- Scientific papers

## **12.2 Evaluative culture**

*Briefly describe how you will support an evaluative culture in the project*

The Learning Alliance approach fosters the knowledge management cycle of innovation, implementation, reflection, revision, and dissemination. Thus, by establishing a Learning Alliance within and among various BSM negotiation processes, an evaluative culture will be engrained as part of the research process. However, to ensure that our research, and in particular the procedural guidelines, reflect best practice in BSM identification and implementation, a final-year post-project evaluation through interviews with stakeholders will be conducted.

## **12.3 Alignment with CPWF core values**

It is easy to argue that the proposed project is well aligned with the CPWF core values. The project is intentionally interdisciplinary in nature, combining physical and biological scientists with social scientists, with a strong focus on science in the service of society, negotiation support and engagement with policy for poverty alleviation. Moreover, the entire research effort will be well grounded in collaboration with local communities who have already worked with some of the lead researchers on the project. Such an on-the-ground partnership will provide the binding context to assure that all of the various research activities are pointing towards a common goal, namely an institutional structure for the identification and implementation of sustainable BSM techniques. The application of participatory and knowledge sharing techniques in past CPWF projects by this team testifies

to the manner in which the proposed work promotes the participation of women and other marginalized groups.

### **13. Assumptions and Risks**

One risk inherent in our research approach is that we will test BSM negotiation support under current conditions without knowing what might change in the future. It is not possible to do otherwise but we need to be cognizant of how global and regional trends may impact the stability of negotiated BSM over time. As our research team has experience evaluating the potential impacts of climate, land use, population and economic change on water systems in the Andes by means of data and modeling techniques, we will be in a good position to introduce consideration of these potentially important global changes into the negotiation process. A key research question here will be to determine whether uncertainty around these changes, and the potential need to develop adaptation strategies, can be accommodated into BSM negotiations.

There are political implications in any transaction affecting the way benefits are shared. The negotiation processes can be exposed to unforeseen reactions of stakeholders that eventually may compromise the successful implementation of a negotiated BSM. The team's considerable experience in the Andes and the mutual respect with which we hold and are held by partners and stakeholders is our main defence against such an outcome. The development of a common platform for negotiation in which scientific information are openly accessible to all has the potential to avoid some of the unequal power relationships that have existed in BSM negotiation to date.

The region is currently undergoing political change. Some of the countries involved in this research are modifying their institutions and modifying people's participation in decision making processes. In others, rapid engagement with the global economy has opened and increased the role for international investments in natural resource use. These two factors are modifying the limits and opportunities that define the current institutional setting around the management and allocation of water resources. The mid-term consequences of these changes are as yet unknown.

### **14. Any other comments to explain your project?**

Our work focuses on (social) science for negotiation support. We will build upon the AguaAndes PSS developed in the BFP Andes, to develop a platform for the negotiation of BSM (a negotiation support system) which is capable of defining for any catchment in the Andes where will be suitable for different types of BSM negotiation, transparently and without significant capacity or data requirements. In complex water management situations for the CPWF basins we will develop a dynamic link between WEAP and the AguaAndes NSS such that the best available models of water availability and water management for the



Andean context are combined to provide the information and dialogue necessary for the successful negotiation of BSM. By having this system learn from projects A2 and A1b and contribute significantly to the outreach of project A3, alongside continuing the existing relationships with end-users that are already implementing water funds and other BSM using AguaAndes and WEAP. we will ensure relevance and utility There is an already an expressed interest in deploying the proposed analysis and tools in support of innovative water resources planning and management, including the development of durable BSM and this is thus a great opportunity for evidence led, sustainable BSM towards more sustainable, equitable and productive water management in the Andes.

## 15. Project Team [\[ix\]](#)

Names of team members	Professional discipline	Institutional affiliation and address	Area of expertise important to this project.	Brief description of research responsibilities with respect to the outputs and activities listed in the Gantt chart.	Commitments
Mark Mulligan	PhD Geography	Department of Geography, King's College London, Strand, LONDON, WC2R 2LS. Tel 44 20 7848 2280. Fax 44 20 7848 2287 mark.mulligan@kcl.ac.uk <a href="http://www.kcl.ac.uk/geography">http://www.kcl.ac.uk/geography</a>	Policy support, hydrology and water resources, project management, environmental modeling, GIS and remote sensing	Project leader, development of the framework for the science module, data integration and support systems development. Knowledge sharing and platform dissemination	Currently Project Leader of Andes BFP, University Reader, senior Fellow UNEP-WCMC.
Jorge Rubiano [Leader]	Agronomist, PhD Geography	Andes BFP Coordinator, Department of Geography, King's College London, Strand, LONDON, WC2R 2LS. Tel 57 2 317 7881277, <a href="mailto:jerubiano@gmail.com">jerubiano@gmail.com</a> <a href="http://www.bfpandes.org">www.bfpandes.org</a>	General coordination, stakeholders involvement, environmental and social monitoring	Frameworks modules integration, assessment of institutional change and monitoring of data integration. Project Coordination	Currently Andes BFP coordinator, 60%. Expected to participate in University lecturing from 2010.
David Purkey	PhD Hydrology	Water Group Leader Stockholm Environment Institute US Center 133 D St., Suite F, Davis, CA 95616 USA 530.753.3035 <a href="mailto:dpurkey@sei-us.org">dpurkey@sei-us.org</a>	Water resources management and modeling, assessment of climate change and water resources, water modeling to support decision making, design of water management innovation.	Manage SEI participation, will contribute to transaction level science analysis	Active managing an SEI research program, will dedicate (48) days to the project.
Andrew Jarvis	PhD Geography	Program Leader - Decision and Policy Analysis,	Data mining, agriculture and	Data provider and repository, linkage	

Names of team members	Professional discipline	Institutional affiliation and address	Area of expertise important to this project.	Brief description of research responsibilities with respect to the outputs and activities listed in the Gantt chart.	Commitments
		International Centre for Tropical Agriculture (CIAT), Bioversity International. Cali, AA 6713, Colombia. A.jarvis@cgiar.org	climate change.	with key high level stakeholders for policy and regulation discussions. Climate change analysis, agricultural crops analysis.	
Juan Leon	PhD Earth and environmental sciences	Associate professor Colombian National University Palmira Campus Carrera 32 Via Candelaria Palmira. Colombia. jgleonh@unal.edu.co	Hydrological monitoring and spatial analysis	Site characterization. Incentive design and resources valuation.	
Tony Allan	PhD, Tony Allan was named the 2008 Stockholm Water Prize Laureate in 2008	Department of Geography, King's College London, Strand, LONDON, WC2R 2LS. Tel 44 20 7848 2280. Fax 44 20 7848 2287 <a href="http://www.kcl.ac.uk/geography">http://www.kcl.ac.uk/geography</a>	The influence of economics, social and political contexts on water use and management.	Project Advisor, A pioneer in the development of key concepts in the understanding and communication of water issues and how they are linked to agriculture, climate change, economics and politics.	Professor Emeritus

*Provide a brief text statement on why the lead institution is well-placed to lead the group.*

**Colombian National University – UNAL**

Is the oldest university in the country (140 years). With more than one hundred recognized research groups in several domains. As a public institute of higher education, it contributes to the development of the “NACION” project. It studies and enriches the country’s heritage and establishes criteria of a scientific, technological and cultural order, with academic and research autonomy. Opened 75 years ago, Palmira Campus has been focused their actions in two well defined domains: agricultural sciences and environmental engineering. In that way UNAL has an excellent team of scientists with important research experience in water sciences, natural and social resources management, monitoring and modeling, as well as land use planning and environmental impact assessment. The University is strategically linked with other government bodies such as the Agricultural and Environmental Ministries.

*Provide brief text statements on why the proposed institutions are qualified to carry out the proposed research.*

**King’s College London** is England’s fourth oldest university and is renowned for the excellence of its teaching and research and its dedication to the ‘advancement of knowledge

in the service of society'. King's research income for 2005-2006 was in excess of \$US220 million. The Environmental Monitoring and Modelling (EMM) Research Group in the Department of Geography has a long standing record of successful and timely completion of high quality and innovative research contracts to international donors, government bodies, charities and the private sector. The Department's annual income is \$US 1-1.2 million of which around half is generated by the EMM group. Research activity is supported by an excellent team of professional support services at Departmental and College level. Research on water science, management and policy within and across the Department's research groups and Centres is a particularly strong area of expertise, influence and activity. Geography has specialists in water science (Mulligan, Gurnell, Cloke) but also in water management (Allan, Gurnell, Francis) and water policy including institutions, policy reform and hydro-politics (Mustafa, Sultana, Allan) and risk (King's Centre for Risk Management). The KCL Water Research Group is recognised both as a major innovator of economic, social and political theory and as a serious contributor to water policy analysis, its leader Tony Allan being recipient of the Stockholm Water Prize for 2008. The Department has a long record of international and multinational project coordination and at least 15 years as a major coordinator of large and complex EC projects under frameworks I to VI. The EMM group has worked with some of the other partners previously in DfID, NERC and CPWF funded projects including the BFP-ANDES.

***The Stockholm Environment Institute (SEI)***, which is celebrating its 20th anniversary in 2009, is an international, non-profit, research institute that works to bridge the gap between science and policy in an effort to promote sustainable development. With research centers located in Africa, Asia, Europe, and North America, SEI is organized to pursue research in six programmatic areas, including water resources. Within the Water Resources Group, SEI staff have expertise in both biophysical and socio-economic aspects of the field. Research within the group is designed to help decision makers across the globe define and implement water management innovations which are both socially equitable and environmentally sustainable. On the proposed project, a major contribution will be made by researchers affiliated with the SEI U.S. Center. This group is particularly well known for the development of the Water Evaluation and Planning (WEAP) system which offers a flexible and transparent modeling environment for those wishing to evaluate the implications of alternative water management and water policy regimes. Under development for over 15 years, and currently in use by thousands of users around the globe, WEAP is an integrated hydrologic and water resources modeling software that allow a user to conduct fully integrated assessments of a water system. Over the past several years, SEI has expanded the use of WEAP through dynamic linkage with socio-economic models developed by colleagues with training in the social sciences. Recent modification to WEAP, which included the development and integration of glacier and páramo modules, make WEAP particularly well suited for application in an Andean context.

***The International Center for Tropical Agriculture (CIAT)*** is a tropical American regional center whose work has a global reach. Currently, about two-thirds of our resources are dedicated to research for tropical America, while the remaining third is divided between

Africa and Asia. Its mission is to reduce hunger and poverty, and improve human health in the tropics through research aimed at increasing the eco-efficiency of agriculture. The Spatial and Economic Analysis for Decision and Policy Support in Agriculture and the Environment holds pan tropical data of biophysical and socioeconomic information. It is linked with many other key partners in Latin America on agriculture and natural resources opening the door for easy networking and lobby at high hierarchy levels of decision making.

## **16. Indicative break down of budget**

This is part of the detailed project workbook.

## **17. Bibliography**

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- [i] This project is one of several that together constitute a research program to tackle the basin development challenge (BDC). Please read the description of the BDC that can be found in the Medium Term plan. If you are successful you will be expected to work as part of a coherent research program, led by the Basin Leader responsible for program coordination and coherence.
  - [ii] Project linkages and project contribution are shown in the BDC impact logic model in the Medium Term Plan
  - [iii] List your research proposed research partners here. Specify if you will work with different partners on to develop different products.
  - [iv] List here only the next users of the research outputs, that is, the people who will directly use them. This could be fellow researchers, policy makers, extension workers or farmers. For example the next user of a policy recommendation is a policy maker, not a farmer. The farmer, who the policy change benefits, is the final user. Specify if different next users will use different outputs.
  - [v] You might find it useful to think in terms of the changes in knowledge, attitudes and skills (KAS) required for the next users to use the research outputs. Specify if different outputs require different KAS for their successful use.
  - [vi] Describe your methodology giving sufficient detail to be understood. Provide relevant references (max. 10). Specify if different outputs require different methodologies. Cross reference to the section on research questions. This is an important section.
  - [vii] Describe the way you will carry out the research, and the capacity building and outreach approaches you will use, to ensure that targeted next users learn what they need to know so as to adopt and use the research outputs. Specify if different outputs have different requirements.
  - [viii] Describe the behavior change(s) in next users resulting from use of the outputs. Specify if different behavior changes are expected through the use of different research products. Examples of behavior changes include farmers adopting a new seed variety or a policy maker changing a policy.
  - [ix] The quality and experience of your project team will help ensure the delivery of quality outputs.