

## Climate Change and farmers responses in rural China, lessons for Africa

**Meine Pieter van Dijk**<sup>1</sup> Professor of Water services management UNESCO-IHE in The Netherlands, [m.vandijk@unesco-ihe.org](mailto:m.vandijk@unesco-ihe.org) Extended abstract for NASAC-KNAW conference in Mauritius, 28-31/3/2012

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### Introduction

How does China deal with the consequences of climate change and can we learn from that experience in Africa? Important external drivers in China such as rapid economic growth, urbanization, climate change and a growing awareness of environmental degradation have contributed to a shift in governance structures. The developments have contributed to a shift in governance structures. These developments have created enabling environment for farmers to take more initiatives. Furthermore, the involvement of NGOs and CBOs in China and new opportunities for initiatives for farmers at the local level is coming up. An analysis of the multi-level governance structures in place shows the role of local government and governance structures and helps to assess to what extent the implementation of policies and programs is happening at the provincial or the local level.

This research took place in the Lanchang River, where seasonal droughts have become more important recently. The Chinese situation can be described as a multi-level governance structure for drought management, the major consequence of climate change in China. At least seven levels can be distinguished between the national and the natural village level where farmers develop initiatives to deal with climate change. We observed a shift in governance structures, resulting in more opportunities for participation and local initiatives. Governance is shifting because of a different environment, economic incentives and urgent events such as climate change and a growing awareness that another approach is needed than the top-down and command and control approach.

We learned that external drivers result in shifting governance, which is also shifting because of more decentralization, involvement with NGOs and CBOs in China and new opportunities for initiatives by farmers and other entrepreneurs at the local level. The effectiveness of policies to cope with drought is limited by financial challenges, organizational challenges, participation challenges and market mechanism challenges.

### Summary of Participants Feedback from Session 2

1. Moringa Oleifera has several health benefits and research is currently under way for prevention of pollution from petroleum products, and cost of water treatment is presently very high, and alternatives need to be given due consideration.
2. Research studies on Carica Papaya are ongoing in the field of wastewater treatment also, as one gram of the composite product can treat up to one litre of water and is therefore cost effective. Good results have been obtained with studies on metal ions and organics.

3. The qualitative parameters of the model have to be quantified through participatory approaches, and the model needs contextual data for more realistic results.
4. Climate models are associated with uncertainties, but the models are helping to improve the understanding of the systems and this consequently makes a huge difference in water management.
5. For a more effective participation, stakeholders have been convened in a working group on water resources in order to identify the pertinent issues in the water sector.

### **What can Africa learn from China**

Every country faces the effects of Climate change (IPCC, 2011). Even the effects for the urban and rural areas may be different. China is a big country and is currently already facing water problems. There are shortages in the north, while there are regularly big floods in the southern part. We know the volatility of the rains will increase due to climate change. In international fora China has not yet promised to fix targets for CO<sub>2</sub> emissions although the country is currently a bigger polluter than the USA and is already making efforts to reduce its emissions. If climate change mitigation policies are starting, climate adaptation policies are even more important. In this contribution I will analyze the recent policies formulated by different levels of government in China and discuss how they are implemented. Secondly we will look at the farmer level and have noticed reactions which indicate a lot of agency at that level. First the current policies of the Chinese government will be discussed and then the reactions of farmers and local enterprises. Finally a number of conclusions for Africa will be formulated.

How does China deal with the consequences of climate change and can we learn from that experience in Africa? Important external drivers in China such as rapid economic growth, urbanization, climate change and a growing awareness of environmental degradation have contributed to a shift in governance structures. These developments have created an enabling environment for farmers to take more initiatives. Furthermore, the involvement of NGOs and CBOs in China and new opportunities for initiatives for farmers at the local level are coming up. Farmers have their own competencies and resources and Ostrom (1990) suggested the main factors which lead them to collective action. An analysis of the multi-level governance structures in place shows the role of local government and governance structures and helps to assess to what extent the implementation of policies and programs is happening at the provincial or the local level.

### **Material and methods**

This research took place in the Lanchang river, where seasonal droughts have become more important recently. The Chinese situation can be described as a multi-level governance structure for drought management, the major consequence of climate change in China. At least seven levels can be distinguished between the national and the natural village level, where farmers develop initiatives to deal with climate change. The research reviews the various reactions to climate change through a large sample survey followed up by case studies in one of China's most affected provinces. We observe a shift in governance structures, resulting in more opportunities for participation and local initiatives. Climate change and a growing awareness of environmental degradation have helped to create an environment in which governance is shifting. Governance is shifting because of a different environment, economic incentives and urgent events such as climate change and a growing awareness that another approach is needed than the top-down and command and control approach. The shifts in governance are facilitated by

more emphasis on decentralization. According to the constitution, the national laws made by the National People's Congress (or its Standing Committee) set the principles, for example for dealing with climate change. The national and local ordinances, which are passed by the State Council or local councils, are used to work out the details. Subsequently, the ministry or local government concerned design their own rules (according to their responsibilities) to implement law and ordinance. Governance is embedded in a larger system of regional, provincial, municipal and district level government structures.

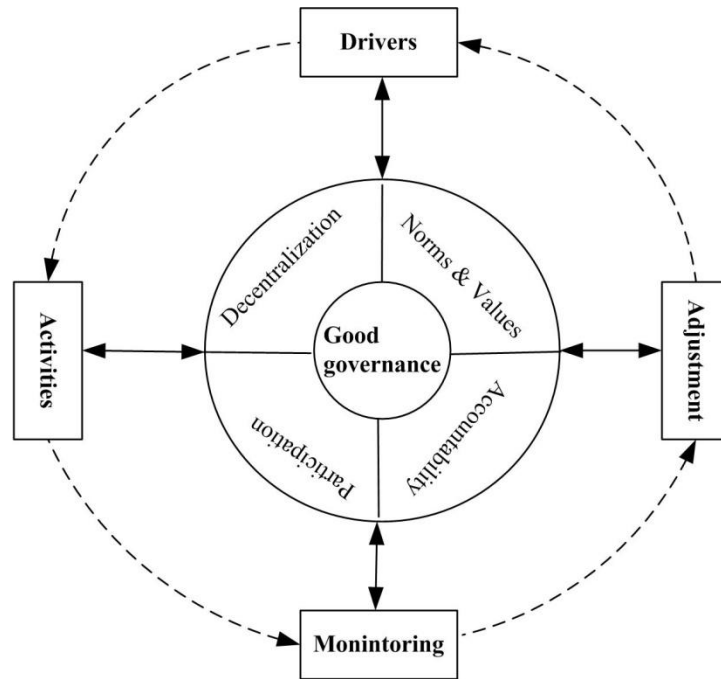
### **Introduction**

Important external drivers in China such as the rapid economic growth, urbanization, climate change and a growing awareness of environmental degradation have contributed to a shift in governance structures in general and in water governance structures in particular. These external drivers result in shifting governance, which is also shifting because of more: decentralization, involvement of NGOs and CBOs in China and new opportunities for initiatives for farmers at the local level. These developments have created an enabling environment for farmers to take more initiatives, because they are relatively left behind and need to defend their own interests. In this contribution the economic incentives which play a role in these developments are analyzed. Using the multi level governance concept, we will indicate the importance of existing governance structures and analyze the emerging initiatives identified in our research in the Yunan province in Southern China. We concluded that farmer's reactions can be classified as passive or active and the active reactions can be interpreted as showing agency, used to advance their own solutions, in a situation where they are not involved in current governance structures, which are not always considered to be effective.

### **The theoretical framework for studying governance**

A theoretical framework for studying governance of climate change will be used. Focussing on governance structures is a relative new approach in China, a country with a top-down structure of government and centralized decision-making mechanism. We will identify different drivers leading to the involvement of more different actors and to different ways of decision making. This leads us to use the (emerging) governance structures concept for China. UNCHS (1999) states that: 'Good urban governance involves participatory decision making'. It refers to 'the complex set of values, norms, processes and institutions by which cities are managed'. UNCHS and the World Bank, leading international organizations in the field of urban development, stress the importance of good governance, as van Dijk. Van Dijk (2006). Good governance refers to the officials formally executing the policies which deliver the services required, but in collaboration with the major stakeholders. One definition of good governance is depicted in Figure 1. The emphasis in this figure is on norms and values, on participation of the population and on controlling what is going on. In a decentralized transparent system local managers are accountable for what they are doing and the results of their interventions can be monitored. We emphasize the importance of participation of the major stakeholders, of allowing initiatives from below and the concrete institutional form that this initiative may take. There is a need for coordination and at the national level it was decided to create four coordinating committees in the State Council including representatives from relevant ministries, administrations, banks, scientific bodies, social associations, NGOs and even the army. Four such committees relevant to drought management are the State Council Leading Committee on Poverty Alleviation and Development (STLCPAD), the National Headquarters of Flooding Control and Drought Relief (NHFCDR), the National Leading Committee of Disaster Alleviation (NLCDA) and the State

Council Leading Committee of Coping with Climate Change (SCLCCCC). Three are organized in a top-down way, while one is meant to be more bottom up.



**Figure 1 Governance under global environmental change**

**Initiatives initiated by the government and Reactions of the farmers**

What are the initiatives initiated by the government and are they actually working through at the local level? Gupta et al. (2012) studied how Chinese institutions are developing policies to help local communities in the Lacang river basin to cope with problems of climate variability and change, by mapping of the relevant policies and interviewing stakeholders to assess how to improve drought preparedness. They conclude that Chinese policy instruments are wider than those mentioned in the literature, but not always these policies get translated into action at local level. According to the household survey, several activities have been taken by farmers to deal with drought

**Table 1 Adaptive activities undertaken by farmers to cope with drought**

Activities	Description	Function
<b>Engage in non-agricultural work</b>	Engage in non-agriculture work at local or urban areas. Some of them work for themselves by operating restaurant or small store	Improve income, reduce dependency on agriculture
<b>Livestock, or fish culture</b>	Spend more energy or money on breeding pork, chicken, and fish	Improve income, reduce the dependency on irrigation
<b>Rotations</b>	Rotations of rice-maize in two	It reduces the dependency

	years are becoming more wide spread	on irrigation water
<b>Change crop structure</b>	Shift to drought resistant crop, such as from rice to maize or coffee, from maize to coffee, tea, orange, from orange to coffee, tea	Improve income, reduce dependency on irrigation; change risk types from drought to low temperature risk
<b>Change land use type</b>	Change cultivation land to pond for fish culture	Reduce dependence on irrigation
<b>Change planting schedule</b>	Adjust seeding time according to short term weather forecasting information, especially for maize seeding	Partly to avoid drought and to reduce the losses caused by drought
<b>Adopt improved seed</b>	Farmers prefer to adopt high productive seeds of maize, and pest resistance and high quality seeds	Improve the crop's resistant ability to drought
<b>Change drinking water mode</b>	Change from separated to centralized drinking water supply mode	Improve water storage and supply ability; Improve stability of water supply
<b>Construct water storage infrastructure</b>	Construct small tanks for drinking and irrigation by farmers individually or by 1 or several communities together	Improve the water storage ability
<b>Change irrigation method</b>	Change from gravity irrigation to drawing water from pumping	Improve ability to access to water
<b>Water transfer</b>	Fetch water from river, well for irrigation and drinking by vehicle or manpower; Import water by pipeline	Improve ability to access to water
<b>Dig well</b>	Dig well for livestock by farmer themselves	Improve ability to access to water
<b>Apply water saving technology</b>	Use cement to construct irrigation channel; Use plastic mulch to store water more efficiently; Use spray irrigation for banana adopted by a big land contractor	Reduce the water consumption
<b>Food storage</b>	Store rice and maize for their own consumption	Reduce the risk of food shortage caused by drought
<b>Use agricultural machine</b>	Adopt new agricultural machine for water pumping, transporting, etc.	Improve ability to access to water

The following governance problems were identified:

1. Although a coordinating body for climate change issues exists, its contribution is limited to four pilot 'green' provinces and the necessary co-management with the ministry of finance to obtain the necessary funds for implementing the programs is not always successful.
2. Implementing the different national policies for climate change at the provincial and local level is not easy. Many national climate change policies have not yet been translated to lower levels of government
3. There is a lack of involvement of the farmers in the decision making process. Formal governance structures are missing, except for the role of the local leaders to submit projects and obtain government subsidies. If the farmers are involved, for example in rural employment and obtaining subsidies, these activities are generally more successful.

### **Results: The role of different governance structures**

Water governance concerns the sum total of all social interactions that control or shape the use of our resources. The focus is not just on government, but also on other stakeholders, such as non-governmental actors. It implies a change in the focus from top-down, to bottom-up, and multi-level governance. Governance points to the need for decision structures and shows the need to monitor to what extent the objectives have been achieved with inputs from all relevant parties. Liang and Van Dijk (2010) analyzed a shift in water governance at the national level in China. In this case more initiatives in the urban areas are developing at the household and enterprise level to deal with drought. National level top-down are confronted with policies concerning grass root level initiatives of Chinese farmers in an affected province (Hao Li and van Dijk, 2012). It describes the emergence of a governance shift in the rural areas. The major research question is: what kind of policies and governance structures are in place in South-western China to deal with the drought consequences of climate change, and what factors explain the reaction of the people concerned? In this contribution the economic incentives which play a role in these developments are analyzed and what can African countries learn from the Chinese experience?

### **Discussion: What African countries can learn from this Chinese experience**

We learned that external drivers result in shifting governance, which is also shifting because of more decentralization, involvement of NGOs and CBOs in China and new opportunities for initiatives by farmers and other entrepreneurs at the local level. These developments have created an enabling environment for farmers and other entrepreneurs to take more initiatives, because they are relatively left behind and need to defend their own interests. In this contribution the economic incentives which play a role in these developments are analyzed. Using the multi level governance concept, we show the importance of existing governance structures and analyze emerging initiatives identified in our research in the Yunan province in Southern China. We conclude the farmer's reactions can be classified as passive or active and the active reactions can be interpreted as showing agency, used to advance their own solutions, in a situation where the government is not considered to be effective. The following gives the different type of farmer's

reaction, shows what this reaction implies and illustrates by means of an example what this actually implies in the Chinese situation.

Type of farmer's reaction	Reaction	Examples
Passive	Wait for government	Instructions to plant drought resistant crops
Active traditional	Using existing governance structure	Village leaders mobilize support at the administrative village level
Active new	Developing new governance structures	Farmers work together to build water supply work
Active individual	Individual reactions	Farmers choose alternative options: trees, cattle, etc. Local companies play catalyzing role

What can African countries learn from the Chinese experience? They can learn a number of things:

1. The need to distinguish which effects will dominate. In the upper Mekong delta, the Chinese part, more droughts are expected, while in the downstream part (in Vietnam) more floods are expected. In general more volatility is expected.
2. Secondly drought expectations require reactions at different levels of government and involves of multi-layer governance structures. In China the government has created coordinating committees in the State Council including not only representatives from relevant ministries, administrations, but also from banks, scientific bodies, social associations, NGOs and even the army. Although the mainstream of drought policies still lies in improving government's authority on offering public goods directly, there is a shift to give non-governmental actors more space to self-govern, because the awareness of local actors, networks and knowledge playing an important role in coping with climate change and drought disaster. The general climate change policy encourages local actors to play a role in adaptation. Also in capacity building for drought preparedness, government tries to involve companies, water user associations and communities and promotes them to think in terms of solving the drought problem. Even the creation of water market is considered.
3. Many policies from central government are hardly implemented at the natural village level. The reform of agricultural taxing system reminds us that before 2001, public funds mainly came from taxes, fees, and apportionment in poor areas (Tsai, 2002). After 2001, the central government started to reduce farmers' burden, and this reform finished with a milestone of abrogating agricultural tax completely since 2006. Although this reform has improved farmers income, it also has blocked an important source of public funds, which is used to offer public goods and services to farmers as well as promoting bureaucratic agencies mediating between government and farmers at the natural village level.
4. With the government retreating from the village affairs, the traditional approach of government will be substituted by polycentric governance structures. This leads to more

self-organization of farmers and companies, which now play a more prominent role in the autonomous villages (Rogers and Hall, 2003).

5. An analysis of the multi-level governance structures in place shows on the one hand that the implementation of policies and programs frequently gets stranded at the provincial or the local level. On the other hand, farmers and other entrepreneurs are no passive bystanders, and take initiatives to deal with the many challenges they are facing, which are partially climate change related and in particular concern the increasing incidence of droughts.
6. It is important to look both at 'formal' and 'informal' institutions. Institutions may be socially-embedded or bureaucratic. Socially-embedded institutions are based on culture, social organization and daily practice (Cleaver 2002). Bureaucratic are the more formal rules and regulations regulating the water sector. Institutions change over time and these changes need to be analyzed. The implementation of climate change adaptation policies may depend on formal and informal practices. Also organizations may be 'formal' or 'informal' (the provision of water services by small-scale independent providers is a good example of informal organizations active in the water supply and sanitation sector). It is important to distinguish between levels at which changes are occurring. We suggest that four levels can be used at which changes can be analyzed. The global level (global policies, UN organizations, etc.), the national level, the sectoral level and the local level. Frequently, changes at a global level (World Fora, etc.) may be different than changes at a national or local level.
7. To improve adaptive capacity, five groups of policies have been emphasized by all levels of governments, which include reform of the agricultural technology promotion system, management reform of Small Rural Water Infrastructure, transferring free labor from rural to urban areas, subsidies for improved seeds and conversion of farmland to forest in mountain areas. There are two reasons why these policies have been implemented at all levels. One reason lies in local government have received subsidies or project fund from central government. Therefore, some special policies are necessary to monitor the use of these funds. Secondly, these policies leave the initiative to local governments.
8. Policies tend to emphasize drought relief polices more than capacity building. The underlying paradigm still seems to be 'disaster management' rather than adaptation.
9. Finding financing for climate change activities is important, given the increase of costs, alternative financing mechanisms, such as the Clean Development Mechanism and Tradable carbon emission right. The objective is to increase the resilience of the different ecosystems. This requires better management, strong formal (public) and informal institutions, public private partnerships (PPPs), sharing of knowledge, and leadership. In China there is a stronger emphasis on technocratic solutions and geo-engineering solutions, but the use of market mechanisms is still at a nascent stage.
10. The effectiveness of policies to cope with drought is limited by financial challenges, organizational challenges, participation challenges and market mechanism challenges.

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<sup>i</sup> Van Dijk is an economist and professor of water services management at UNESCO-IHE Institute for Water Education, PO Box 3015, 26001 DA Delft, the Netherlands, E-mail: m.vandijk@unesco-ihe.org.