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Adaptive Delta Governance

Learning from Dynamic Deltas

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Executive Summary

In deltas humans interact constantly and intensively in rapidly growing numbers with their ecological environment against a backdrop of increasing climate change impacts. The fundamental question is how do governance systems, as a nexus of science, policy and society, cope with uncertainties and complexity in the socio-ecological system in different deltas? This nexus implies a need to design more sustainable and equitable policies based on solid scientific ground to respond to the needs of societies and people.

This policy brief reflects on key lessons learned and the way forward in three deltas: the Rhine-Meuse in the Netherlands, the Mekong in Vietnam, and the Sacramento–San Joaquin River in the United States. It provides recommendations for improving delta governance targeted at practitioners, policymakers, and researchers working on climate change, environmental policy, politics, and governance. The recommendations focus on dealing with the uncertainties of the impacts of climate change, on closing the innovation gap between science, policy and society, and on facilitating effective stakeholder participation, learning and integration.

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Introduction

Deltas, which are home to more than 80 percent of the world's population, are under increasing pressure from population growth, economic development, and climate change. As a consequence, basic needs such as food, water, health, and shelter are in danger. Deltas thus pose important challenges for the post-2015 development agenda, especially in reaching the Sustainable Development Goals (SDGs). Delta governance is an essential but complex process for dealing with dynamic deltas.[1] Ecological or technical changes may trigger governance responses. Vice versa, changes in governance structures may alter the sustainability and adaptive capacity of the system.

''Our future depends on the relation we build between science and policy" said Irina Bokova, director-general of United Nations Educational, Scientific and Cultural Organization (UNESCO) at the launch of the United Nations Scientific Advisory Board in January 2014. The interface formed by the triangle science, policy and society is a crucial component of delta governance.

Researchers need to communicate scientific findings in an appropriate and accessible way to policymakers and civil society for those actors to make the best possible choices in drawing up policies aiming at sustainable solutions to environmental problems. Designing sustainable and equitable policies should be based on solid scientific ground and should respond to the needs of societies and people. This will benefit from co-creation: scientists, policymakers, and civil society jointly seek the best way of understanding and guiding complex change processes.

This policy brief reflects on key lessons learned and the way forward in three deltas: the Rhine-Meuse Delta in the Netherlands, the Mekong Delta in Vietnam, and the Sacramento-San Joaquin Delta in the United States. The authors aim to share general insights and lessons learned in the governance of climate adaptation in deltas, recognizing that each delta requires context-specific approaches.[2] Based on the workshop's synthesized overview, the brief offers recommendations for improving delta governance. These recommendations are targeted at practitioners, policymakers, and researchers working on climate change, environmental policy, politics, and governance.

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Addressing Governance Challenges in Three Deltas

This policy brief discusses two aspects in each case study:

- What are the key governance challenges?
- How are these challenges addressed, in particular relating to the process of co-creation?

While the three deltas are different in social, cultural and policy contexts they are beset by similar problems, such as sea level rise, subsidence (or the sinking) of land, extreme flooding, drought and institutional compartmentalisation (silos). In general, governance in these deltas requires dealing with uncertainties and complexity in the socio-ecological system.[3] The authors interacted directly during the workshop with key experts from the deltas, who provided a wealth of information on the cases.

Rhine-Meuse Delta, the Netherlands

In the Netherlands, the Delta Act of 2011 provides for a delta program in a long-term vision focusing on the year 2100. The program aims to defend the Netherlands against rising sea levels and river floods and to ensure adequate freshwater supply in the future, taking into account climate change and socioeconomic developments. The program was initiated as a precautionary policy in response to recent disasters in other developed countries, notably Hurricane Katrina. The Delta Act is the legal basis for the Delta Fund, which is used to finance future investments in the delta.

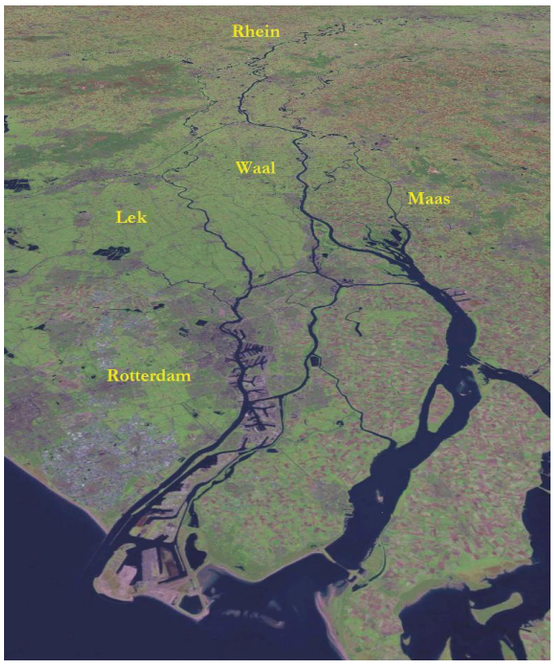
Path dependency is a main problem here. An important part of the Delta Program's investment has thus far gone into dike reinforcements.

Nevertheless, the Delta Program recognizes that technical measures, such as raising dikes, will no longer be sufficient to deal with increasing water levels in the rivers and the accelerated rise in sea levels in this century.

According to experts in the workshop, the main challenges in implementing the Delta Program are:

- impediments to cross-sectoral policy making;
- lack of a sense of urgency;
- uncertainties in future scenarios on climate, population, economy, and society;
- little attention paid by the government to new and innovative approaches; and
- few governmental incentives to encourage out-of-the-box thinking, not only for existing governance arrangements, but also for large-scale infrastructure on flood protection.[4]

The Delta Program acknowledges that reducing uncertainties by research or improved measurements alone is inadequate. Adaptive planning is also needed.[5] Accordingly, it deployed a set of guiding principles during policy development: solidarity, flexibility, sustainability, general support (consensus), and evidence-based policymaking through joint fact-finding. To support these principles, the Delta



Program established a multilevel governance structure (at programme level) outside formal bureaucratic boundaries with broad and horizontal stakeholder participation.[6] The stakeholders involved were already familiar with and accustomed to such a governance approach, which has been used before in, for example, the Room for the River program where rivers are given space to expand into side channels and wetland areas to prevent or mitigate floods as well as restoration of natural values. The policy also introduces disaster management (evacuation and preparation) and spatial measures for flood risk reduction rather than flood protection alone, although a major shift to multi-level safety was introduced in subsequent policy documents, from 2009 onwards.

Mekong Delta, Vietnam

The Mekong Delta Plan of 2014 is the result of a top-down decision-making process as Vietnam's governance system is characterized by hierarchy and centralization. There is ongoing debate, however, on the question of scale and how to formalize appropriate collective choice arrangements for climate adaptation, inspired by a set of policy reforms (Doi Moi, or renovation) that started in 1986. Within this context, a legal framework for integrated water management was established in the 1990s allowing fo the development and participation of civil society organizations in the water sector. From 2011 to 2013, Dutch and Vietnamese expertise was mobilized to produce the Mekong plan. "The vision is good," an observer said, "but we are still missing the roadmap."[8] This roadmap needs to be both affordable and accessible and to take into account the limited capacities of participating local stakeholders.

According to the experts at the workshop, the main challenges for designing the roadmap are:

- strong hierarchies and uneven distribution of power and knowledge among stakeholders;
- large national investments in technical infrastructure and limited investments in "social management";
- inequality in education, welfare, and other socioeconomic conditions; and
- large-scale migration of highly educated people from rural areas in the Mekong to Ho Chi Minh City, causing an uneven distribution of human capacities.

"Poor farmers think of their next harvest, not about next generations, because they have to feed their families now."[9] A change from technical to social investments—including community empowerment, capacity building, awareness raising, and improved socioeconomic conditions—by the Vietnamese government is therefore highly recommended.

Social investment should focus on fine-tuning bottom-up approaches with top-down control, combined with capacity-building (to include raising awareness) for the most vulnerable stakeholders

in the Mekong Delta. A pertinent example is the Participatory Planning Process for Climate Change Adaptation in the Lower Vam Co River Basin from 2011 to 2013.[10] This is one of the first projects in Vietnam to introduce a comprehensive approach for full-scale and meaningful participation of relevant stakeholders at province, district, and commune levels, including capacity-building interventions, to develop a climate change adaptation strategy.[11] The project offers several important lessons in co-creation: [12]

- Political buy-in and ownership by the provincial government was critical to the project's success. Government co-funding ensured that public resources would be well spent and entirely justified.
- The knowledge content of a multi-stakeholder dialogue is critical: what topics and issues are covered and how well informed the debate about them is. This typically depends on access to scientific and experienced-based knowledge. At the same time, deliberative opportunities—time to question, seek clarification, discuss assumptions, and examine arguments—are critical in exploring alternatives and poorly known risks and interests.
- An effective planning process hinges on providing adequate information and inviting key stakeholders to participate at critical stages of the strategy development process.
- The quality of participation is a function of many factors, including venues, session formats, how agendas are set, time and quality of briefing materials, and facilitation.
- How facilitation, meeting structure, and venues influence the openness and multidirectionality of conversations is important. In practice, interaction between stakeholders or between the public and government can be managed in a variety of ways

Sacramento–San Joaquin Delta, United States

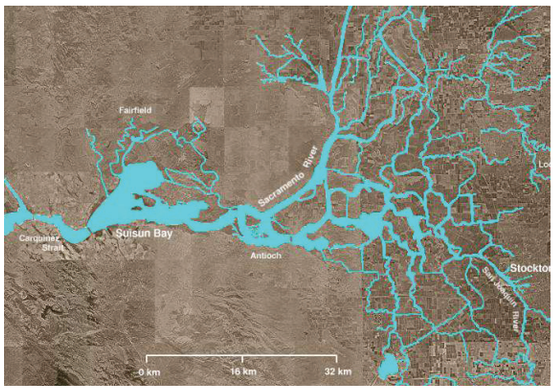
Sacramento-San Joaquin Delta is a U.S. inland delta situated in northern California. The drier southern part of the state depends heavily on water that historically flowed through the delta. Policy discussions have revolved around the export of water from the north to the south and related delta stressors, the uncertainties of climate change, and how to increase the resilience of the south to extreme droughts.

According to experts at the workshop, the main challenges for water export and resilience improvement are threefold:

- dramatic decline in populations of native species due to diversions of freshwater for agricultural development in the San Joaquin Valley and urban development in southern California, agricultural and urban pollutants, and introduced and invasive species;
- uncertainties of climate change; and
- a large number of stakeholders with divergent interests.[13]

In 1994, to facilitate collaboration among scientists, managers, and policymakers at water and environmental agencies, the state of California and the U.S. Department of the Interior signed the Bay Delta Accord. Although the broad objective was unsuccessful, scientific collaboration did increase. In 2009, to enhance the partial success of the effort, the state legislature passed the Delta Protection Act, which led to the formation of the Delta Stewardship Council (DSC). The council was mandated to design a delta plan in close collaboration with the Delta Independent Science Board (DISB) and the Delta Science Program (DSP), which are responsible for reviewing delta science programs to promote the use of "best available science" and for coordinating and internally reviewing delta scientific reports from all agencies. DSC and DISB meetings are open to the public and the exchange with stakeholders can be lively. The DSP has facilitated the collaboration of all agency scientists in developing a Delta Science Plan mandated in the Delta Plan. Co-creation is also enhanced through public seminars co-sponsored with the nearby University of California, Davis and brown bag lunches given by scientists working in many capacities.

The Bay Delta Conservation Plan runs parallel to the Delta Protection Act. The plan is led by the State's Department of Water Resources and financed by water users in the south of the delta. The plan entails a aquaduct under the delta that aims at both improving the reliability and quality of the water transported southward and restoring the delta habitat. The peripheral aquaduct is still in the planning stages and must be approved as a part of the Delta Plan. Key challenges swirl around how the aquaduct and habitat restoration and management should be designed given the uncertainties of climate change and whether the plans will improve conditions for native fish in the delta.



Lessons Learned from Three Deltas

The approach in all three delta plans is toward a more holistic approach and includes increasing the adaptive capacity of the socio-ecological system. Adaptive capacity pertains to change and disturbance and reflects learning through knowledge sharing and responding to feedbacks.[14] Increasing the capacity of systems to adapt is key to responding to climatic changes: both natural and social systems with high adaptive capacities can retain their integrity under a broader range of conditions better than systems with low adaptive capacities.[15] Promoting adaptive capacity should be based on a sound understanding of what determines the resilience and vulnerability of these systems. For natural systems, capacity depends on the biodiversity within an ecosystem: the higher the level of biodiversity, the greater the resilience. For social systems, adaptive capacity depends on the ability to learn from mistakes and to generate experience in dealing with change, which

is in turn largely connected with the ability of individuals and their social networks to innovate.[16] Knowledge as well as its dissemination among all stakeholders and the ability to act on new insights is continuously enacted in social processes, which requires integrated cooperation structures and advanced information management.[17] In practice, poor information (availability and quality), as well as its exchange, communication, and dissemination, and sectoral fragmentation are seen as main reasons for low adaptive capacity in the social system.[18] Generating knowledge itself, however, is not enough to build adaptive capacity. Learning how to sustain social-ecological systems in a world of constant changes needs an institutional and social context within which to develop and act. In other words, it requires adaptive delta governance.

Policy Recommendations

The impacts of climate change are visible in all three cases and in all low-lying areas of the world. At the same time, scientists and other stakeholders disagree over future climate change scenarios and possible mitigation and adaptation strategies. The debate is also about the water management domain's license to operate. Water managers need to invest in their legitimacy given the many, conflicting pressures on delta areas, for example, by organizing meaningful connections with other policy domains. Ineffective stakeholder participation, whether in the form of failure to come to an agreement or of to participate, presents obstacles for the planning processes. In some cases, it brings the process to a halt. Moreover, the lack of innovation in both the technical and the governance sense contributes to a path-dependent vision. The following recommendations are derived both from those made during the final workshop discussion among participants and experts, and from an analysis of the cases and recommendations by Patrick Huntjens concerning building adaptive capacity. [19]

Workshop participant comments on Mekong case study:

"Technological measures, or hard measures, are easy to be implemented through science and investments from abroad. It is the human capacity that needs to be invested in, if implementation is to be successful. What use is dike enhancement if the people behind it are still starving?"

Address the Uncertainties of Climate Change Impacts

- Promote adaptive capacity among individuals, groups, and organizations to adapt to changes and develop an implementation framework.
- Move from addressing impacts in a specific area or sector to developing holistic approaches, such as increasing the adaptive capacity of the socio-ecological system and integrating sectors. Safeguard flood safety and fresh water security while improving the other functionalities of delta areas.
- Accept the complexity of the issue and accompanying uncertainties of the impacts. Adopt an adaptive planning approach that accommodates changes, uncertainties, and complexity into scenarios for decision making. Promote adaptive capacity to deal with unforeseen changes, use flexible monitoring and social learning, emphasize the importance of stakeholder participation, and support open and innovative decision-making processes.

Close the Innovation Gap between Science, Policy and Society

- Put problems and solutions into cultural and historical perspectives rather than focusing solely on technological innovation.
- Support reflective and adaptive approaches that benefit long-term delta planning and avoid locked-in situations.
- Involve and invest in the younger generation (i.e. Young Water Professionals) for fresh perspectives and innovation, such as by using new technologies.
- Strengthen dialogue between citizens, scientists and policy makers. This requires the necessary competencies from all involved, and joint reflection on existing patterns of interaction
- Earmark 1 percent of subsidies for climate change research for creative dissent to bring about change in relations of science and politics, not just from within the scientific establishment but also by allowing the creation of alternative knowledge spaces.[20]
- Create physical space for delta experiments where real-scale experiments on delta protection can be tested.

Workshop participant comments on Sacramento-San Joaquin case study:

> "There is no socio-ecological interactive systems framework. People tend to use old concepts, such as conservation biology and restoration, which are focused on maintaining or going back to the way things were, as opposed to assimilating to the current circumstances. One example is the term invasive species, which has a negative connotation, when [in fact] it is often nature's way of coping with climate change."

Facilitate Effective Stakeholder Participation, Learning, and Integration

- Adopt participatory planning approaches that incorporate public and stakeholder input in decision-making to create ownership and enable better solutions or solutions complementary to those delivered from the top down.
- Bring all relevant stakes to the table, making it easier to distinguish short-term from long-term problems.
- Organize effective mutual learning across deltas, taking into account that knowledge is always specific to a particular situation.
- Integrate the fields of disaster risk reduction, sustainable development, and adaptation to climate change to better avoid redundant or conflicting policies. Incorporate both interaction among and an overarching institution that oversees all three communities of practice, or frequent interaction at a forum where relevant institutions from the three communities of practice regularly come together.
- Encourage policy integration on the water-food-energy nexus by attempting to better understand the complex relationships between water, energy, and food policies and how these can be addressed in policy development and implementation.

Endnotes

1 | *Delta governance*, as defined here, refers to the decision process through which individuals and institutions (public and private) interact (in formal and informal ways) to manage their affairs and make decisions to live safely and sustainable in deltas, coastal zones, and river basins. The phrase *dynamic delta* is used here to describe a perpetually dynamic, complex delta system with continuous adaptation, that is, a delta in which development is characterized by uncertainty, nonlinearity and feedback mechanisms between linked social and ecological systems.

2 | An in-depth analysis of lessons learned is only possibly by taking into account contextual factors, such as cultural/historical, socio-economic and political circumstances (Huntjens, 2010), but such an analysis is beyond the scope of this policy brief

3 | A socio-ecological system (SES) is an integrated concept of humans in nature and stresses that the delineation between social systems and ecological systems is artificial and arbitrary (Berkes et al 2001). The SES approach holds that social and ecological systems are linked through feedback mechanisms, and that both display resilience and complexity (Berkes et al 2003).

4 | A major issue with large infrastructural developments is the way they commit capital and institutions to trajectories that are difficult to change in the future." Jon Barnett and Saffron O'Neill, "Maladaptation," *Global Environmental Change* 20 (2010): 212. This has also been described as the problem of "sunk costs" or path dependencies (Helen Ingram and Leah Fraser, "Path Dependency and Adroit Innovation: The Case of California water," in *Punctuated Equilibrium and the Dynamics of U.S. Environmental Policy*, ed. Robert Repetto (New Haven, CR: Yale University Press, 2006).

5 | *Adaptive planning* is an iterative feedback and learning strategy to cope with complexity and uncertainty in decision-making. It seeks to maximize flexibility, keeping options open, and avoid lock in. Patrick Huntjens, Claudia Pahl-Wostl, Benoit Rihoux, Maja Schlüter, Zsuzsanna Flachner, Susana Neto, Romana Koskova, Chris Dickens, and Isah Nabide Kiti, "Adaptive Water Management and Policy Learning in a Changing Climate: A Formal Comparative Analysis of Eight Water Management Regimes in Europe, Asia, and Africa," *Environmental Policy and Governance* 21, no. 3 (2011): 145–63.

6 | Stakeholders involved include ministries, provinces, municipalities, water boards, universities and nongovernmental stakeholders.

7 | Room for the River was initiated by the Dutch government in 2005 to improve flood protection (taking into account climate change scenarios) and to enhance the beauty of the river region of the Netherlands while leaving space for new economic potential, nature, and leisure facilities.

8 | Ho Long Phi, "Delta Stories from Vietnam," presentation at the workshop "Learning from Dealing with Dynamic Deltas," September 24, 2014, Rotterdam.

9 | *Ibid*

10 | Patrick Huntjens, Bouke Ottow, Ralph Lasage. "Participation in Climate Adaptation in the Lower Vam Co River Basin in Vietnam." I*n Action Research for Climate Change Adaptation - Developing and Applying Knowledge for Governance*, ed. Arwin van Buuren, Mathijs van Vliet, Jasper Eshuis. Routledge Series on Advances in Climate Change Research, 2015

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12 | Huntjens et al. "Participation in Climate Adaptation in the Lower Vam Co River Basin in Vietnam."

13 | More than 120 agencies are active, including farmers associations, conservationists, the Delta Stewardship Council, the federal and state courts, the State Water Resources Control Board, and other nongovernmental land managers.

14 | Christo Fabricius, Carl Folke, Georgina Cundill, and Lisen Schultz, "Powerless Spectators, Coping Actors, and Adaptive Co-managers: A Synthesis of the Role of Communities in Ecosystem

Management," Ecology and Society 12, no. 1 (2007): 29.

15 | Barry Smith and Johanna Wandel, "Adaptation, Adaptive Capacity and Vulnerability," Global Environmental Change, 16 (2006): 282–92.

16 | Fabricius et al., "Powerless Spectators."

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18 | *Ibid*

19 | *Ibid*

20 | Vulnerability in Technological Cultures: New Directions in Research and Governance (Inside Technology)

Photo credits:

Rhine-Meuse(-Scheldt) Delta:
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