



An analytical framework for strategic delta planning: negotiating consent for long-term sustainable delta development

C. Seijger, W. Douven, G. van Halsema, L. Hermans, J. Evers, H.L. Phi, M.F. Khan, J. Brunner, L. Pols, W. Ligtoet, S. Koole, K. Slager, M.S. Vermoolen, S. Hasan & V.T.M. Hoang

To cite this article: C. Seijger, W. Douven, G. van Halsema, L. Hermans, J. Evers, H.L. Phi, M.F. Khan, J. Brunner, L. Pols, W. Ligtoet, S. Koole, K. Slager, M.S. Vermoolen, S. Hasan & V.T.M. Hoang (2017) An analytical framework for strategic delta planning: negotiating consent for long-term sustainable delta development, Journal of Environmental Planning and Management, 60:8, 1485-1509, DOI: [10.1080/09640568.2016.1231667](https://doi.org/10.1080/09640568.2016.1231667)

To link to this article: <https://doi.org/10.1080/09640568.2016.1231667>

 View supplementary material 

 Published online: 01 Nov 2016.

 Submit your article to this journal 

 Article views: 882

 View related articles 

 View Crossmark data 

 Citing articles: 5 View citing articles 

An analytical framework for strategic delta planning: negotiating consent for long-term sustainable delta development

C. Seijger^{a*}, W. Douven^a, G. van Halsema^b, L. Hermans^c, J. Evers^a, H.L. Phi^d,
M.F. Khan^e, J. Brunner^f, L. Pols^g, W. Ligtoet^g, S. Koole^h, K. Slagerⁱ, M.S. Vermoolen^c,
S. Hasan^a and V.T.M. Hoang^b

^aUNESCO-IHE, Department of Integrated Water Systems and Governance, Delft, The Netherlands;

^bWageningen University and Research, Water Resources Management Group, Wageningen, The Netherlands; ^cDelft University of Technology, Faculty of Technology, Policy and Management, Delft, The Netherlands; ^dVietnam National University, Center of Water Management and Climate Change, Ho Chi Minh City, Vietnam; ^eCenter for Environmental and Geographic Information Services (CEGIS), Climate Change Study Division, Dhaka, Bangladesh; ^fInternational Union for Conservation of Nature (IUCN), Indo-Burma Group, Ho Chi Minh City, Vietnam; ^gPBL Netherlands Environmental Assessment Agency, The Hague, The Netherlands; ^hBosch Slabbers Landscape + Urban Design, The Hague, The Netherlands; ⁱDeltares, Inland Water Systems Unit, Delft, The Netherlands

(Received 15 January 2016; final version received 30 August 2016)

Sectoral planning on water, agriculture and urban development has not been able to prevent increased flood risks and environmental degradation in many deltas. Governments conceive strategic delta planning as a promising planning approach and develop strategic delta plans. Such plans are linked to actions and means for implementation in the short-term, in line with long-term strategic choices. This paper introduces an analytical framework that focuses on the role of actors, innovative solutions and participatory planning tools in negotiating consent for the strategic choices in a delta plan and its implementation. Cases of Bangladesh, the Netherlands and Vietnam are discussed as a plausibility probe to explore the framework's potential. The probe reveals that the framework is promising to explain the process and outcomes of strategic delta planning in urbanizing deltas. The paper ends with an initial research agenda to stimulate research and discussion on this new delta planning approach.

Keywords: Strategic delta planning; actor coalitions; innovations; participatory planning tools; implementation

1. Introduction

Strategic delta planning increasingly gains attention in the water sector to come to a more sustainable development of deltas. Deltas are located between rivers and coasts and they provide an attractive environment for human settlements. They connect seaward commercial trade with inland shipping, provide valuable resources for society (e.g. oil, gas, fish), offer fertile land for agricultural food production and present a unique natural environment. About 500 million people live in deltas worldwide (Kuenzer and Renaud 2012; Syvitski *et al.* 2009) of which 80% live in 14 deltas (Bucx *et al.* 2010; Bucx *et al.* 2014). Sustainable delta development implies a balance at the delta

*Corresponding author. Email: chris.seijger@unesco-ihe.org

level for current and future generations on human needs, economic objectives and environmental concerns.

Due to strong social-economic developments, conventional delta planning can never completely resolve the development challenges many urbanizing, engineered deltas face: rapid urbanization, industrial growth, infrastructure expansion, agricultural intensification, floods, subsidence, salinization and degradation of the environment (Giosan *et al.* 2014; Kuenzer and Renaud 2012; Nguyen and James 2013; Nicholls, Hoozemans, and Marchand 1999; Renaud *et al.* 2013; Syvitski *et al.* 2009). Given the interrelated nature of these development challenges, their complexity and related uncertainty, governments are initiating long-term strategic delta planning processes to come to more sustainable delta development under different socio-economic circumstances; examples can be found in Bangladesh, England, Myanmar, the Netherlands, the US and Vietnam (BanDudeltas 2014; CPRA Louisiana 2012; Deltacommissie 2008; Delta Stewardship Council 2013; Environment Agency 2012; Royal HaskoningDHV *et al.* 2013; Royal HaskoningDHV *et al.* 2014).

In this paper, we define strategic delta planning as a public-sector led process through which a long-term vision (the strategic delta plan), and actions and means for implementation are produced that shape and frame what a sustainable delta is and may become (after Albrechts 2004, 747). Key characteristics of strategic delta planning are a long-term planning horizon of 50–100 years and strategies that cover multiple policy domains such as urban planning, industry, transport, agriculture and water. Furthermore, strategic delta planning aims to influence and guide developments towards sustainable delta development by making strategic choices. The problems that are addressed are inherently complex or wicked (Rittel and Webber 1973; Hartmann 2012; Head 2008) due to the uncertainties, the interconnectivity of delta problems and the different interests and (spatial) claims of actors involved (Norgaard, Kallis, and Kiparsky, 2009).

Due to these characteristics, strategic delta planning differs from conventional delta planning (see Table 1). Conventional delta planning is characterized by short 4–6 year planning cycles and sectoral master plans that have ambitious targets but often lack coordination or prioritization across master plans (BanDuDeltas 2014; Royal HaskoningDHV *et al.* 2013). A strategic delta plan provides a framework in which other policies, programmes and projects can be developed as a congruent set of

Table 1. Key characteristics of two delta planning approaches.

	Conventional delta planning	Strategic delta planning
Purpose	Guide administrative and regulatory decisions.	Inform strategic choices towards sustainable delta development.
Scope	One or two policy domains, a focus on technical solutions. Plans are blue-prints to be implemented.	Multiple policy domains and incorporating social and financial issues. Strategies are discussed generally and in line with long-term strategic choices.
Time horizon	Planning horizon up to 10 years, might be connected to sectoral master plans with a 30–50 year planning horizon.	Planning horizon of 50–100 years, strategies focus on the short- and long-term.

development objectives. The plan influences implementation towards a strategic priority without controlling the outcomes as, over time, new technologies, actor coalitions and strategic options may emerge. In other words, strategic directions of developments in the delta are outlined, developments that policies may subsequently facilitate. The strategic delta planning approach has evolved from other planning approaches in the water sector.¹

The objective of this paper is to enhance the understanding of how strategic delta planning processes evolve into implementation, by introducing and testing the usefulness of an analytical framework. Most research on strategic delta planning has focused on the content in the planning process (Klijn *et al.* 2015, Prinsen, Sperna Weiland, and Ruijgh, 2014), the connection between knowledge and policy (Werners, Van Loon-Steensma, and Oost, 2016) and framing as a strategy for agenda setting and policy adoption (Boezeman, Vink, and Leroy, 2013; Verduijn, Meijerink, and Leroy, 2012; Vink *et al.* 2013). To date, no frameworks have been presented to analyse strategic delta planning as part of a longer-term development process in deltas and the connections and disconnects between past development efforts, new planning and implementation. This is relevant as delta planners require—due to the wicked problems they are confronted with—something other than a detailed plan to strategically influence developments in a delta. Instead, delta planners have to seek consent on the strategic choices and contours of a strategic delta plan with many organizations and individuals who have significant power in enabling, constraining or contesting implementation. These may range from powerful decision-makers to formal planning bureaucracies and from societal movements and networks to informal influential scientists that operate out of public view.

Strategic delta planning thus becomes a challenging process of seeking ways to accommodate the interests of actors such that there is consent for a strategic delta plan, funding and implementation projects. Consent, and the process of negotiating consent with powerful and influential actors, thus emerges as a relevant concept that could explain the positioning of strategic delta planning processes within longer-term processes of delta development, planning and implementation. In this paper, we postulate the hypothesis that the degree of consent reached on the strategic delta plan (be it forged by enforcement or accommodation) is heavily influencing the degree to which the strategic plan is able to shape the subsequent policies and developments over a lifespan of 10–20 years.

The narrative of the paper is as follows. This paper is about strategic delta planning and its role in longer-term processes of delta development. Since strategic delta planning covers different socio-political interests and spatial claims, consent is a key feature to explore the impact of strategic delta plans in guiding delta developments towards sustainable delta development (Section 1). The aim of this paper is to introduce an analytical framework ‘the Hourglass’ for strategic delta planning processes (Section 2), and explore whether it is a meaningful concept to understand how strategic delta planning processes work, and what determines their successes and weaknesses. For that purpose, we apply the framework in the strategic delta planning cases of Bangladesh, the Netherlands and Vietnam (Section 3). The probe confirms the potential usefulness in explaining processes and outcomes of strategic delta planning (Section 4). Having established the potential usefulness, further research is proposed to analyse how consent is negotiated and how successful strategic delta planning processes are (Section 5).

2. Methodology

2.1. *Links between strategic spatial planning and strategic delta planning*

The Hourglass framework is informed by insights from the field of strategic spatial planning (cf. Albrechts 2004; Faludi 2000; Friedmann *et al.* 2004; Healey 2009). Strategic spatial planning refers to collective efforts to re-imagine a specific region and to translate the result into priorities for area investment, conservation measures, infrastructure investments and principles of land regulation (Healey 2004). It is aimed at changing the minds of people through the development of strategic spatial plans (Faludi 2000; Laurian *et al.* 2004; Talen 1996). Strategic spatial planning processes may vary in their degree of selectivity and stakeholder involvement (Bafarasat 2014). The main difference between strategic delta planning and strategic spatial planning is the scope. Strategic delta planning addresses the strong interplay between the social-economic and physical-ecological system (e.g. rivers, mangroves, wetlands, and coasts) meanwhile taking into account upstream interventions, whereas strategic spatial planning mostly focuses on the urban environment (Friedman *et al.* 2004; Healey 2009). As a result, strategic delta planning is broader in scope, since sets of strategies have to be congruent across spatial (local, regional, national, river basin) and temporal scales.

Various frameworks have been developed to analyse strategic spatial planning processes. Some focus on the strategic planning and decision-making part (Albrechts and Balducci 2013; Healey 2009) whereas others focus on strategic spatial planning through projects (Bafarasat 2014). However, as Albrechts and Balducci (2013) state, the connection *between* planning and implementation of plans is hardly made. One exception is Faludi (2000) who provides a learning perspective to connect planning and implementation. The limited attention to connect planning and implementation is a serious limitation to understanding strategic delta planning processes. They take place in the public domain, and are both about content – formulating a strategic delta plan – and about implementation to contribute to a more sustainable development of deltas. Providing a framework that analyses both the planning and implementation may therefore respond to the limited attention for implementation and action in strategic planning (Albrechts and Balducci 2013). It is unrealistic to expect a 1:1 implementation of a strategic delta plan – a pitfall of master plans that are often ‘dead on arrival’ (Brody and Highfield 2005). Instead, the aim of strategic delta planning is to influence delta developments through political support and investment into a specific direction of strategic development choice(s) without controlling the outcomes. Outcomes cannot be controlled as new technologies, insights and actor coalitions may push developments into a different direction, or establish alternative development options that have not been contemplated.

We focus on negotiating consent as the connecting element between planning and implementation in strategic delta planning. Negotiating consent is a more practical interpretation of the term consensus². It is not so much about seeking consensus, but more about seeking ways through which different interests of actors can be accommodated such that different actors are prepared to ‘go along with’ (Checkland and Scholes 1990). The strategies or plans for which consent has been accommodated may then reflect an improvement of the current state of affairs in the delta. There is not one ‘best’ outcome for strategic delta planning, instead, multiple options and perspectives may exist on how to develop a delta. As a result, a variety of actors, problem frames and solutions have to be accommodated to gain support for planning and implementing a strategic delta plan. Negotiating consent thus becomes a simultaneous process of social

learning (Ison, Röling and Watson, 2007) that aims to change the minds of people, and, a support-seeking process to ensure that sufficient actors can go along with the plan. As in any negotiation for consent, potential participants, issues and substantive outcomes may be excluded (Connelly and Richardson 2004). Actors may step out initially when plans are too abstract and decide to step in and renegotiate consent for strategies when they become more detailed during implementation at sub-regional scale. The latter implies that consent is renegotiated for sustainable delta development and its associated strategic choices across different decision-making phases involving different actors. Depending on which powerful and influential actors support a delta plan, consent may be strong and long-lasting or weak and momentary. With strong consent it is more likely that the actions in the implementation phase are congruent with the earlier defined strategic aims to come to sustainable delta development.

2.2. *Decision-making in strategic delta planning*

The decision-making process of strategic delta planning is characterized by three different phases of agenda-setting, strategic delta plan formulation and implementation³. Negotiating consent is the linking pin between planning and implementation. The phases are connected to two identifiable decision-moments, that of developing a strategic delta plan and the decision to accept the plan. Implementation is analysed by exploring whether policies and projects are congruent with the desired long-term development of the delta.

The phase of agenda-setting is the initial stage of a strategic delta planning process. It refers to putting the topic of strategic delta planning on the agenda. Determining the agenda for the strategic delta planning process is a struggle wherein political actors try to create space for a strategic delta planning process. During this phase, actors have to learn how strategic planning may overcome the shortcomings of traditional planning (Albrechts and Balducci 2013). Awareness and appreciation has to be raised with politicians and other societal actors that the integrated and congruent approach of strategic delta planning is needed to come to a more desirable future for the delta; for instance, by moving away from more traditional sectoral approaches like hard engineering measures, degrading wetlands and eroding coastlines (Giosan *et al.* 2014). Due to uncertainties and long-term developments, awareness has to be raised that alternative scenarios for sustainable delta development exist. It is in this phase that actors strive to have 'their' problem formulation accepted as the legitimate basis for the formal planning process; the main agenda and key issues for strategic delta planning are determined. Actor coalitions are formed and problems and initial solutions are framed. In analytical terms, the planning process moves into the next phase when the decision has been taken to formulate a strategic delta plan.

The second phase is the strategic delta plan formulation stage. Similar to strategic spatial planning, it is focused on a strategic (delta) plan that can be backed by political support and serves as the frame of reference for future project plans (Faludi 2000). Usually, a clear time-line of one to a few years is set for the development of a plan. Actors are involved in a process of negotiating consent for a political decision, since a national government or ministry has to approve and endorse a delta plan. This political commitment is needed, since the plan describes (at the delta level) the strategic priorities, the developments needed and the means for implementation. Due to the political and time pressures involved, the planning process has to converge from an initially broader agenda to a focused strategic delta plan that is widely supported. The planning process moves into the third phase when a political decision has been taken to accept the formulated strategy or plan.

The third phase is that of implementation. Different policies, programmes and projects contribute to the envisioned long-term development of the delta. Many of these implementation policies and projects will have existed prior to the formulation of a strategic delta plan, but in this stage, where necessary, they would have to be re-oriented to give reality to the earlier decided strategic direction (Albrechts and Balducci 2013). The decision-making context may change from a national perspective in strategic planning to a more local-regional perspective in implementation. Given the change from a national to local and regional perspectives, and the multitude of policies and programmes involved, divergence is expected to occur from the original strategic delta plan. Issues may return that were previously excluded since they were hampering consent at the delta level. Alternatively, solutions and actor coalitions may change as the motivations and abilities of local actors differ from those involved in the strategic delta plan formulation phase (Phi *et al.* 2015). Divergence may still resemble the spirit of the strategic choices but supplemented with local preferences and opportunities, and thus local consent for implementation. Furthermore, as time goes by, new issues may emerge that alter actors' positions towards the strategy and the negotiated consent.

2.3. Strategic delta planning as an Hourglass

Due to the (theorized) convergence and divergence on strategies for long-term development of the delta, we symbolize strategic delta planning as an Hourglass (see Figure 1). Over time, a planning process may move down in the Hourglass, probably with many stops and starts. Dynamics and progress in the Hourglass are affected by the wider context of politics and institutions, formal and informal rules of decision-making and prevailing cultures of (participatory) planning and negotiation (Briassoulis 1989; Innes 1996; Ostrom 2007; Sabatier and Weible 2007).

Inside the Hourglass, three dimensions are analysed that are closely linked to negotiating consent (see Annex A for a literature review of these dimensions):

- (1) Actor coalitions are defined as groups of individuals and organizations that unite in a planning process. The formation and change in actor coalitions is a measure of the degree of consent across actors and actor coalitions on the strategic delta plan and its implementation. An analysis into actor coalitions captures the dynamics between actors in supporting, rejecting, shaping and negotiating proposed plans and strategies. Since actors are usually involved in delta management for many decades, they may need new frames and perspectives to negotiate consent;
- (2) Innovative solutions are defined as solutions that entail a new product, idea or way of doing something in delta planning and management. It may also refer to the novel application of a solution in a particular region, or the (re)-introduction of more traditional solutions, such as bringing back floods or floating rice; Innovative solutions may support consent among actors and across actor coalitions when they are multi-functional and thus attractive to a variety of actors and sectors. Therefore, innovative solutions potentially entail new opportunities for accommodating the interests of actor coalitions when compared to conventional delta solutions. Innovative solutions may have been proposed years before a strategic delta planning process is started;
- (3) Participatory planning tools are defined as tools and approaches that enable a variety of actors to participate in the planning process. Given the wicked challenges of sustainable delta development, participatory planning tools may

facilitate discussions and social learning between actors and support consent negotiations as actors can see, discuss and shape the different pieces of a strategic delta plan.

In sum, the Hourglass framework builds on four major assumptions. First, convergence and divergence on long-term delta development strategies is expected to occur from agenda setting to plan formulation and implementation. Second, the convergence-divergence is a consequence of negotiating consent for the strategic delta plan. Actors, issues and strategies may be excluded due to political and time pressures. Divergence is expected to occur to negotiate regional consent. Since the setting changes from delta to (sub)regional scales, local interests and perspectives have to merge with the developed plan for implementation. Third, over time (typically more than 10 years), actors and innovative solutions may trickle down following different routes in and outside of the Hourglass. The numbered arrows in Figure 1 represent different trajectories for actors and consent negotiations: (1) step forward, consent strengthens; (2) step out, consent weakens; (3) step in, consent strengthens; (4) sidestep, consent initially weakens and may be strengthened in implementation. Fourth, actors and innovations may change in constellation over time, but for implementation they have to fit in the strategic priorities of the developed plan. Participatory planning tools may support participation and social learning during the formulation of a strategic delta plan and its subsequent implementation projects.

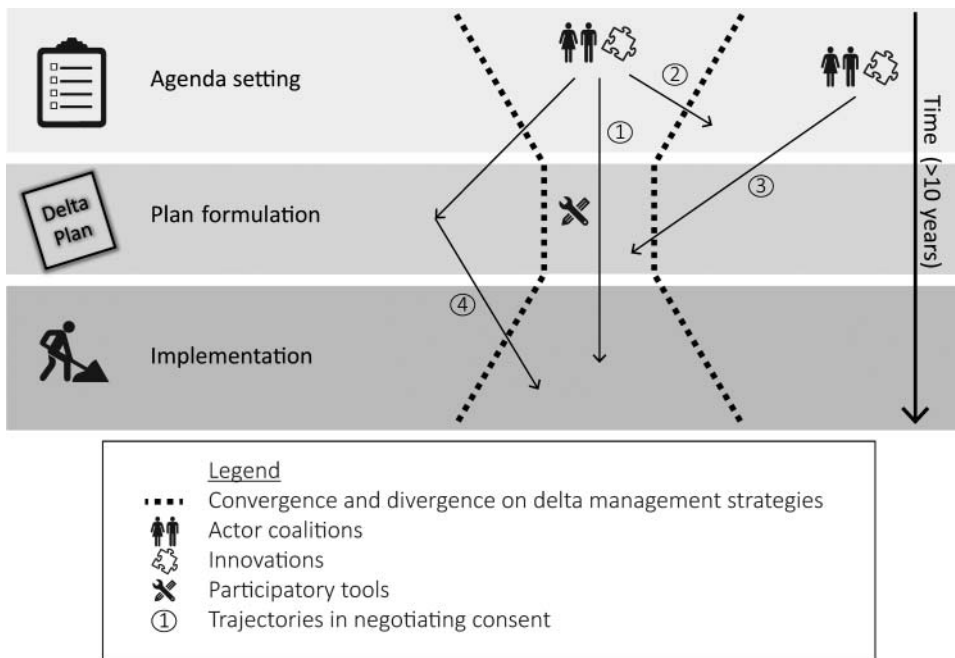


Figure 1. The Hourglass analytical framework to analyse a strategic delta planning process. The dotted lines reflect the porous boundary of strategic delta planning with the wider context of politics, institutions and prevailing cultures. The convergence-divergence is a consequence of negotiating consent for planning and implementation. Actors and innovations may follow various trajectories in relation to consent negotiations: (1) 'step forward,' (2) 'step out', (3) 'step in', (4) 'sidestep'.

2.4. Method to probe the Hourglass framework

Different types of case study research exist. In this paper, we present a ‘plausibility probe’ case study of the Hourglass framework. A plausibility probe is a preliminary case study that aims to explore the usefulness of a relatively untested analytical framework (George and Bennet 2005). It is thus a first test to explore whether a framework can provide meaningful explanations of a phenomenon under study. In addition, plausibility probe case studies can uncover new hypotheses (*idem*). We have selected the deltas of Bangladesh, the Netherlands and Vietnam, since strategic delta planning processes in these countries are initiated, but under very different social-physical conditions in terms of the political system, country income, population and total river flow (see Table 2 and Figure 2). These different settings provide a strong test for the usefulness of the Hourglass framework in analysing strategic delta planning and implementation.

The case analyses were created with the input of a three-day workshop in May 2015. During the workshop, 13 participants from Bangladesh, the Netherlands and Vietnam applied the Hourglass framework to the three deltas. The participants were invited given their expertise in strategic delta planning and their role of researcher or advisor in the Strategic Delta Planning Project (see Annex B for an overview of workshop participants).

The Hourglass framework was a topic of discussion in several sessions. First, presentations were given on the three deltas to get a better understanding of the deltas and the specifics of the strategic delta planning processes. For instance, in the Netherlands a balance is sought between leading the way and leaving room to cope with future uncertainties. In Vietnam, the Mekong Delta Plan does not immediately fit the more sectoral oriented planning system as there is no clear budget and timeline allocated within the plan.

Second, plenary discussions were held on where to place the three cases in the Hourglass: Bangladesh and Vietnam were – at that time – considered to be in the plan formulation stage, whereas the Netherlands was regarded to be in the implementation phase. Institutional changes were discussed as a necessary step in each country to move a strategic delta plan into implementation.

Third, sub-groups were formed to discuss dynamics in- and outside the Hourglass for each case. For instance, that it is interesting to explore which actors bypass the strategic delta plan or operate informally through backchannels, and how local planning merges with strategic plans in the implementation phase.

Overall, the workshop revealed that the Hourglass was a useful framework to discuss all sorts of dynamics involved in strategic delta planning (socio-political, short-term long-term, national – regional level, strategic and conventional planning). The workshop discussions served as first input for the case analyses presented in this paper. The case analyses were revised during subsequent rounds of writing and analysis by the co-authors who have been involved in (parts of) the planning processes in the studied deltas. In addition, case analyses were strengthened with key planning documents and scientific literature. As the plausibility probe has a preliminary nature and mainly serves to test the Hourglass framework, more detailed, in-depth case studies will be part of upcoming research.

3. Plausibility probes of strategic delta planning in Bangladesh, the Netherlands and Vietnam

Sections 3.1–3.3 discuss the three cases of strategic delta planning. The case analyses provide insight into the planning processes up to September 2015. Each analysis contains

Table 2. Characteristics of three very different cases of strategic delta planning.

Social-economic aspects	Factor		Cases		Source
	Institutional context	Bangladesh	The Netherlands	Vietnam	
	Political system	Two major party democracy	Multi-party democracy	Single party	
	Level of (country) income	Low	High	Lower middle	World Bank Data Countries and Economies [†]
	Population (country)	156.6 million	16.8 million	89.71 million	World Bank Data Countries and Economies
Physical aspects	Rivers that form the delta	Ganges-Brahmaputra-Meghna	Rhine-Meuse-Scheldt	Mekong	
	Discharge per year (10^9 m ³ /yr)	1070	80	424	Global Runoff Data Base (GRDB) [‡]
	Size of delta	Large (> 10,000 km ²)	Medium (1,000–10,000-km ²)	Large (> 10,000 km ²)	Giosan <i>et al.</i> 2014
Strategic Delta Planning	Sediment surplus-deficit to keep up with sea-level rise	Deficit	Deficit	Deficit	Giosan <i>et al.</i> (2014) and Van Der Meulen <i>et al.</i> (2007)
	Name and time period	Bangladesh delta plan, 2011 – onwards	The Dutch Delta Programme, 2007 – onwards	Mekong Delta Plan, 2010 – onwards	

[†] Accessed through: <http://data.worldbank.org/country> (last visit on 16 12 2015).

[‡] Accessed through: http://www.bafg.de/GRDC/EN/02_srvcs/21_tmsrs/211_ctlgs/catalogues_node.html (last visit on 16 12 2015). Data on river discharges were obtained from the following stations: Ganges Farakka and Brahmaputra Bahadurabad, Rhine Lobith, Mekong Kompong Cham Cambodia.

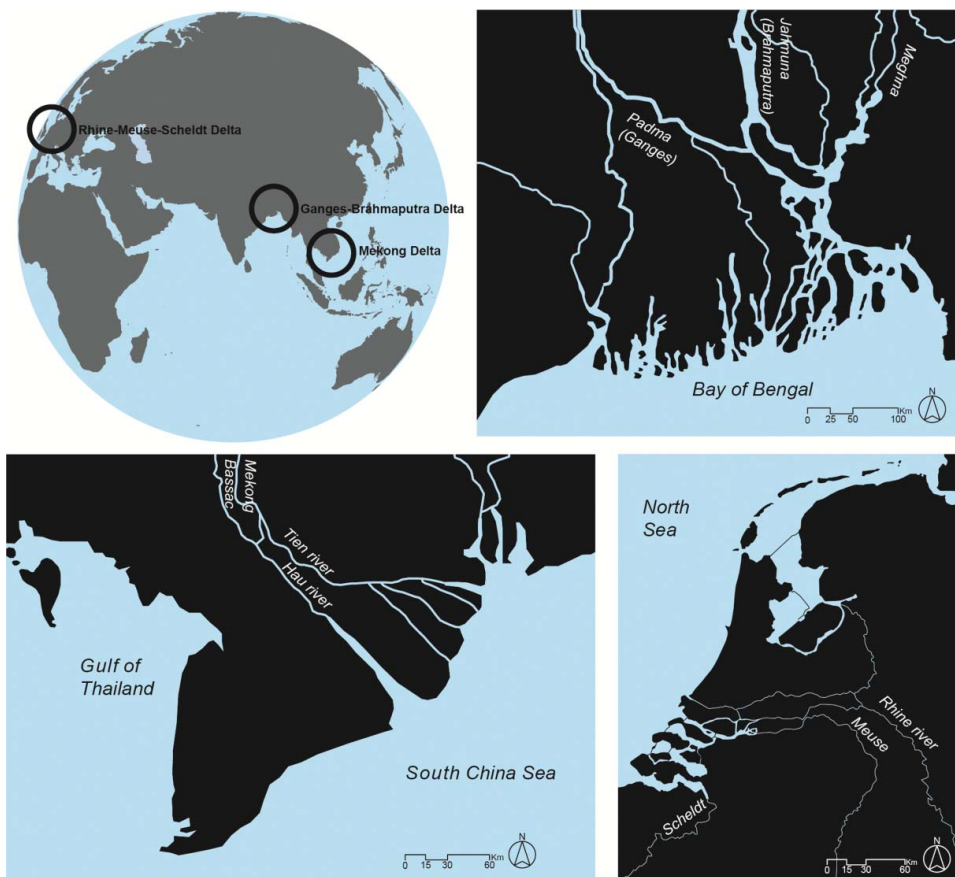


Figure 2. Graphical overview of the deltas of Bangladesh, southern Vietnam and the Netherlands. Source: adapted from Bux *et al.* (2010).

an introduction, the relevant decision-making phases, dimensions of the Hourglass and insights on consent negotiations.

3.1. Strategic delta planning in Bangladesh – Bangladesh delta plan 2100 (BDP)

Bangladesh is a rapidly developing country that is coping with a population growth of 2 million people per year. The delta is prone to food insecurity and is frequently confronted with natural hazards (floods, cyclones, river bank erosion, droughts) and intensive abstraction of groundwater (Shamsudduha *et al.* 2009). The strategic delta planning process is initiated to improve the living conditions of the people of Bangladesh through appropriate water management and governance (Choudhury *et al.* 2012). An integrated and holistic vision is necessary to optimize short-term solutions and to prepare for future change (BanDuDeltas, 2014). The BDP is linked to the country's overall policy goals of becoming a middle income nation by 2021 and a developed country by 2041. Conventional planning in Bangladesh is done through 5-year planning cycles. Output of the BDP should be building blocks in successive 5 Year Plans of the Planning Commission.

3.1.1. Hourglass

The agenda-setting phase ran from 2011 to 2014. Driven by a Dutch development aid agenda on water and deltas, the government of Bangladesh requested support from the Dutch government for advice on a Bangladesh delta plan. During 2011–2012 a BDP preparatory team of Bangladeshi and Dutch experts explored the demands and commitment for a BDP. They also described the contours of the plan (Choudhury *et al.* 2012).

The strategic delta plan formulation phase started in 2014, when a contract was signed between the Bangladeshi-Dutch consortium ‘BanDuDeltas’ and the Royal Netherlands Embassy in Dhaka. The Inception Report and baseline studies set the scene and highlight the knowledge gaps. The delta plan is expected to be formulated by September 2016 (BanDuDeltas, 2014). The plan, as it is currently developed, has a wide scope covering 19 thematic areas, ranging from water resources to urbanization, fisheries, institutions and knowledge management. To structure these themes regional hotspots are defined that focus on six regions: the coastal zone, the drought-prone area, the major rivers and estuaries, urban areas, wetlands in the east, and the hilly area in the southeast. Scenarios are developed to highlight potential future circumstances in Bangladesh, distinguishing between water conditions (extreme or moderate) and economy (diversified or traditional).

Bangladesh knows the challenge of implementing plans due to limited resources. The Government tried to secure funding through the World Bank and public private collaboration by signing an agreement in June 2015. To foster implementation, actors in the BDP focus on legislation, regulatory instruments and funding matters before the plan is fully developed. A new Delta Act is promoted (BanDuDeltas 2014) that could be merged with the Water Act (2013). The implementation of previous master plans, such as the Flood Action Plan (1989) and the Dhaka Metropolitan Area Development Plan (1995), suggest a problematic boundary between actors operating at the national and local level, making it challenging to implement master plans at the local level.

The Hourglass framework analyses three dimensions that are linked to negotiating consent; actor coalitions, innovative solutions and participatory planning tools (Figure 1). Inside the Hourglass, three dimensions are analysed that are closely linked to negotiating consent. Regarding the actor coalitions, a range of stakeholders is involved in the development of the plan. Political parties are involved to ensure that they are aware of the BDP and support it. Also, stakeholders are consulted at the community, regional and national levels. To that end, various participatory planning tools have been used such as the Touchtable Atlas, an interactive surface computing platform that visualizes and integrates different maps (BanDuDeltas 2014). It is used as an interactive infographic tool but also serves as a data portal for the maps that are prepared for the BDP. Multiple design workshops are held in each hotspot region, thereby providing means for wide (regional) stakeholder involvement. Local knowledge was gathered in the design workshops. Furthermore, participants became informed, and began to think and discuss within the scope and long-term planning horizon of the BDP. The workshops therefore enhanced support for the BDP process. During workshops with government officials and water experts, scenarios were interactively developed. The scenarios helped the participants to think about the (long-term) future and initial strategies in different scenarios.

Several innovative solutions are discussed, amongst others climate proofing the low-lying polder areas in the southwest coastal zone that are confronted with problems of land subsidence, water logging and flood risks. The concept of tidal river management entails that polder embankments are systematically breached to facilitate sediment delivery and

elevation recovery (Auerbach *et al.* 2015), meanwhile supporting shrimp and rice cultivations. A different concept is that of total polder control, which optimizes water and land use management within a polder through subdivisions and designated areas for shrimp and rice cultivation. The first innovation is supported by environmental organizations, the agricultural sector and local leaders, whereas the second innovation is supported by the ‘traditional’ water sector of the Bangladesh Water Development Board, regional water boards and contractors.

3.1.2. Negotiating consent for the Bangladesh Delta Plan

Several strategies were applied to come to consent for the BDP. The BDP team recognized they would need a broad and strong actor coalition to support and implement the BDP. It is not sufficient to develop the BDP in a water-centred coalition; usually the Water Resources Planning Organization coordinates water strategies and master plans. Instead, the BDP makes a deliberate effort to institutionalize its planning process in the mainstream planning and budget cycles of the Planning Commission; the country’s central planning development agency. As a result, the BDP is now closely linked to the Planning Commission and delivers input to the successive 5 Year Plans of the Commission. Furthermore, the applications of participatory planning tools contributed to consent as they structured the thoughts and discussions of participants into the scope, planning horizon and scenarios of the BDP. The workshops therefore enhanced support for the BDP planning process at the national and regional level.

3.2. Strategic delta planning in the Netherlands – from Delta Committee to Delta Programme

The Netherlands is a low-lying flood prone country. After the disastrous floods in 1953, the first Delta Committee recommended the ‘Delta Works’: a sectoral master plan of major dams and barriers that nowadays protect the southwest of the Netherlands against flooding. In 2007, a new strategic delta planning process was initiated to avoid future (flood) disasters. The second Delta Committee explored how the Netherlands could be made climate proof for the very long-term (up to and beyond 2100), to ensure that the Dutch are safe against flooding, while remaining an attractive and liveable place (Deltacommissie 2008).

3.2.1. Hourglass

The agenda-setting phase took place before and during 2007, when the Dutch Cabinet installed the second Delta Committee. Different agendas were brought together in the mandate of the second Delta Committee. Whereas the Appointment Resolution emphasizes sea level rise and sustainable development of the Dutch coast, the Committee broadened its mandate by looking at flood control, fresh water supply, liveability, agriculture, industry, nature and energy for the entire country (Deltacommissie 2008). The Committee formulated the strategic delta plan in 2008 and presented, in September, an integrated vision that primarily addressed flood protection and sustainability. The integrated vision contained strategic choices in flood control (e.g. increasing flood protection levels with factor 10) and water management (e.g. increase the fresh water storage by raising the Lake IJsselmeer level 1.5 m). In addition, strategic administrative measures were proposed that would support implementation (i.e. Delta Programme, Delta Act, Delta Fund).

The implementation phase is represented by the Delta Act, Delta Programme and Delta Fund. The Delta Act stipulates: (1) a Delta Programme that is updated yearly, reporting on the implementation of strategies for flood control and water supply; (2) a Delta Fund of €1 billion per year for these strategies; and (3) a Delta Commissioner, who coordinates the Delta Programme and prepares the annual progress reports of the Delta Programme (Delta Commissioner 2012). The administrative measures of the Committee's strategic delta plan have been implemented. However, the Act, Programme and Fund represent a narrower focus (flood control and water supply) than the integrated vision of the Committee. This is also reflected in the Delta Fund, since the majority is reserved for flood control whilst 5% is earmarked for measures of water supply and water quality (Delta Commissioner 2014). The scope of the programme was broadened in 2010 by adding spatial adaptation (urban and rural areas, critical infrastructure) after the need for spatial adaptation was stressed by the Ministry of Housing, Spatial Planning and the Environment (Ligtvoet and Van Minnen 2009). However, almost no budget is earmarked in the Delta Fund for spatial adaptation measures.

The Delta Programme worked in nine sub-programmes that contributed to five Delta Decisions (a.o. standards for flood control, spatial adaptation and region-specific strategies for Lake IJsselmeer and the Rhine-Meuse delta). The 2015 Delta Programme translates the Delta Decisions into preferential strategies for the different sub-regions (Delta Commissioner 2014). The preferential strategies developed by the Delta Programme have not yet been implemented. One strategy, that of new standards for flood risk management, is expected to come into force by 2017 (Delta Commissioner 2014).

The key dimensions of the Hourglass (actor coalitions, innovative solution, participatory planning tools) are also present in this case. Regarding actor coalitions, the Delta Committee organized stakeholder involvement during the delta plan formulation for the most part through meetings and three plenary sessions. These sessions focused on physical systems, problem analysis, scenarios, strategies, decision making and spatial planning (Arcadis 2008). Yet, in the implementation phase, the Delta Commissioner had the clear task to build actor coalitions and many stakeholders were involved in joint fact finding processes (Verduijn, Meijerink, and Leroy 2012; Werners, Van Loon-Steensma, and Oost 2016). The participatory approach of the Delta Programme involved a large number of actors (national government, provinces, municipalities, water boards, private parties and NGO's). At least two participatory planning tools were applied in the implementation phase. Design charrettes, collaborative sessions wherein designers and participants draft and draw solutions to (planning) problems, were applied in different sub-programmes, such as Lake IJsselmeer region, Coast and Southwest Delta. In these charrettes, various spatial strategies were developed. Delta scenarios (developed over 2011–2012 with a 50–100 year time horizon) are used to assess the robustness of the Delta Decisions and the preferential strategies (Delta Commissioner 2014).

The drastic and innovative measures of the second Delta Committee have been replaced with more modest, small-scale innovations, such as breach-resistant dikes, multifunctional dikes and flexible water level management (Delta Commissioner 2014). An innovation that may structurally change water availability is to reduce outflow of the river Rhine through the New Waterway, the main navigation link between the harbour of Rotterdam and the North Sea. Adjustments in the waterway could result in water savings that may then be used for other purposes. Another innovation that is considered is the introduction of salt tolerant crops that may resolve water shortages in the south-western delta and the Wadden Sea islands.

3.2.2. *Negotiating consent for the Delta Committee and the Delta Programme*

The political consent for findings of the Delta Committee were strong: the findings were supported by the Parliament in 2008 and key political decisions were made by approving the Delta Act, Delta Fund and Delta Programme. Although the second Delta Committee formulated the strategic delta plan with an integrated vision on flood control and sustainable development, the implementation of the Delta Programme is more limited in scope, and the largest part of the budget in the Delta Fund is earmarked for flood control, which signals a continuation of past practices. This questions the strength of the consent among the various actors, and the room for manoeuvre that they were allowed where it comes to moving away from previous practices. Furthermore, in obtaining this consent, the drastic innovative measures of new flood protection norms and raising water levels for fresh water supply played an important role as they imposed a sense of urgency (Verduijn, Meijerink, and Leroy 2012). During the implementation phase the innovations are no longer drastic, instead they are described in a generic way without specifying locations or requirements for implementation, to support consent at the national and regional level. Lastly, participatory planning tools were frequently applied in the Delta Programme. A direct link between the planning tools and consent is, in this probe, difficult to observe, as many different tools were applied ranging from design charrettes, scenarios and joint fact finding processes. Nonetheless, the design charrettes and extensive stakeholder participation during the Delta Programme are a clear example of continued consent negotiations in the implementation phase.

3.3. *Strategic delta planning Vietnam – Mekong Delta Plan (MDP)*

The Mekong Delta is vulnerable to climate change, especially regarding floods, droughts and salinity intrusion. The intensification of rice and shrimp farming has had severe consequences on water quality and fresh water supply. In addition, major developments of irrigation expansion and hydropower in upstream countries (Thailand, Cambodia, Lao PDR and China) are likely to further affect the Mekong hydrology (Cochrane, Arias, and Piman 2014). The combined effects of climate change (higher wet season rainfall and prolonged drought periods) and upstream developments indicate substantial increases in wet season flood levels, and potentially pronounced decreases in dry season minimal flows. Employment and migration is another issue in the delta, since the young and educated leave the region for jobs in cities as Ho Chi Minh City and Hanoi. For these reasons, a strategic delta planning process is initiated to respond to the consequences of climate change and to ensure sustainable socio-economic development (Royal HaskoningDHV *et al.* 2013). The MDP was prepared under the auspices of the deputy prime minister and under authorization of the Ministry of Natural Resources and Environment (MoNRE) and the Ministry of Agriculture and Rural Development (MARD).

3.3.1. *Hourglass*

The agenda-setting phase took place between 2009 and 2011. Dutch political actors had been advocating a strategic delta planning process in Vietnam. As a result, in 2010, the Vietnamese Government requested the Dutch Government for assistance in developing an MDP similar to the Dutch Delta Committee. The same year a strategic partnership was signed and 8 sector studies were conducted by Vietnamese Institutes and Dutch partners

to come to a more precise formulation of problems, trends and opportunities in the delta (Deltares *et al.* 2011). The strategic delta planning phase ran from 2011 to 2013. The MDP team consisted of Dutch and Vietnamese members. The plan was completed in December 2013. It identifies four scenarios that highlight distinct potential socio-economic developments such as industrialization, food production and agro-business. For the three regions (upper-middle-coastal) specific measures are proposed ranging from abandoning the triple rice policy to installing urban flood safety and brackish (poly) aquaculture systems. The MDP was approved in June 2014 by both prime ministers. The MDP provides a new strategic policy guidance framework for new ministerial policies and master plans of the Vietnamese line ministries. As attested in the Mekong Delta Forum of February 2015, the MDP is embraced by Vietnamese line ministries and the Donor Support Group as the strategic framework for future policy setting and development of the Mekong Delta. Funding is in part secured since the World Bank stated it will use the MDP to assess the feasibility of proposed projects that will be funded by a proposed 300 million USD loan.

The cooperation between ministries and provinces is challenging in Vietnam. Yet cooperation for implementation is needed given the interplay between strategic choices in the different regions of the delta. Some first changes in planning styles have been seen as the Vietnamese begin to realize the enormity of the challenges implementing the MDP. At the Mekong Delta Forum, one Vietnamese stakeholder suggested that a Delta Law may be needed to anchor and implement the integrated vision as independently operating ministries are unable to address this complex challenge. Also, stakeholders begin to talk in terms of trade-offs between options instead of seeing planning as a wish list of measures.

The Hourglass dimensions of actor coalitions, participatory planning tools and innovative solutions also appear in this case analysis. Regarding actor coalitions, the most powerful actors are the ministries in Hanoi and the provincial authorities in the delta – both governed by the Communist party structure. Furthermore, at the policy level important actors are the international donor support group and international environmental organizations such as IUCN. National and regional experts participate in focal groups. The line ministries and their institutes are now actively engaged, together with an international donor support group, in elaborating policy and development plans that support the strategic framework and choices of the MDP. A powerful ministry that was less involved in the MDP is the Ministry of Planning and Investment, responsible for strategic advice on social-economic development.

Participatory planning tools have been applied lightly and were mainly focused around charrettes and public consultations in a four-tier system: (1) with line ministries and public administrators, through the Strategic Office in Hanoi, and a tailor-made policy and master planning review; (2) with the Governors and Administrators of the Mekong Delta provinces in two dedicated MDP sessions of the yearly meetings of the Mekong Delta Economic Development Committee (MDEC) of the Party's South-West Steering Committee; (3) a series of dedicated focal group discussions with experts (policy makers, administrators, and academic experts from national and regional institutes); (4) a series of MPD dedicated provincial public consultation sessions with provincial and district administrators and key stakeholders from sectors and NGOs.

The MDP proposes innovative solutions such as reconsidering the triple rice policy and a major flood diversion. Regarding the triple rice policy, the MDP served as a platform to discuss this drastic measure publicly for the first time ever in Vietnam, as a means of providing adaptive land use planning to flood management, as well as

sustainable economic development. In the coastal zones, the innovations centre on the active embracing of salinity intrusion, and the adaptation of coastal defence and land use systems to a brackish economy of poly-culture aquaculture and coastal mangroves.

3.3.2. Negotiating consent for the MDP

The actor coalition that gave its consent to the MDP appears to be strong as powerful ministries, international NGOs and financial donors have embraced the MDP as a framework for future developments in the Mekong Delta. To come to this consent, the public consultation sessions and charrettes served to elaborate consent among a wide range of stakeholders on the strategic policy analysis of the MDP. During the consultations it also became clear that there is strong preference among stakeholders towards the agro-business industrialization scenario as a strategic choice for a delta tailored socio-economic development. This scenario marked a distinct change in development with regard to rice policies that have dominated the last decades of developments in the delta. The development and application of the scenarios thus contributed to consent and convergence in how people thought about long-term developments in the delta. The innovative multi-use solutions had a central role in making the scenarios realistic. They were specific enough to serve as strong images for alternative developments in the delta, yet they are also described without specifying locations or technical details to promote consent in the Mekong Delta and at the national level.

3.4. Lessons of the plausibility probe for the Hourglass framework

The plausibility probe showed that all the elements of the Hourglass framework are clearly discernible in very different deltas. The probed cases enrich the Hourglass framework with insights related to the key dimensions, and, the shape and dynamics.

First, the probe shows how a focus on the key dimensions in the Hourglass framework (actors, tools, innovations), helps to describe and understand how consent is negotiated in a strategic delta planning process. Regarding actor coalitions, the probe suggests a further sharpening of the framework regarding actor coalitions, suggesting that two types of actor coalitions can be identified in strategic delta planning. One type is the ideological or advocacy coalition, where actors unite around their belief systems or core values (Sabatier and Weible 2007). The other type is the 'pragmatic coalition' where actors unite as they realize that they can accommodate their different interests by forming a more opportunistic, or 'strategically rational' coalition; a coalition as the most efficient way to realize strategic objectives. Consent in a pragmatic coalition may be less long-lasting than in an advocacy coalition, as (pragmatic) actors will leave the pragmatic coalition if they think that is the best way to pursue their own interests in a new decision-making round. The Dutch case exemplifies the role of pragmatic actor coalitions. Although the second Delta Committee formulated the strategic delta plan with an integrated vision on flood control and sustainable development, the eventual implementation of the vision, through Delta Act, Fund and Commissioner saw a renegotiation of some of the most far-reaching suggestions such as raising Lake IJsselmeer water levels by 1.5 meters. This may imply that the ministry formed a pragmatic coalition with the second Delta Committee, giving consent to the establishment of a new Delta Fund and Commissioner as an institutional innovative approach to pursue its long-lasting and traditional agenda of flood control. How actor

coalitions differ in their attitude to delta plans and solutions will be explored in upcoming research.

In terms of innovative solutions, the Dutch and Vietnamese cases illustrate that radical solutions can be introduced within a strategic delta planning process due to the long-term strategic planning scope. The embeddedness of the Mekong Delta Plan in a perspective of economic development and outlook, in which the cultivation of triple rice is no longer deemed as economically competitive, is hereby instrumental and characteristic of the wickedness of the problem and the holisticity of the MDP approach. The triple rice policy was initiated to promote food security for Vietnam. Its sustainability is questioned since the associated high dike systems increase flooding downstream and the intensive use of fertilizers and pesticides degrades soils and ecosystems. Questioning the 'status quo' creates space to introduce multipurpose innovative solutions such as poly-aquaculture systems that contribute to regenerating mangrove forests. To promote consent on regional and national levels, the innovative solutions in the Dutch and Vietnamese delta plans are described in a generic way without specifying locations or requirements for implementation. How innovative solutions precisely travel into the implementation phase and change actor coalitions and consent is subject to further research.

With respect to participatory planning tools, the probe reveals that a variety of existing tools and approaches are applied to strategic delta planning processes, resulting in delta scenarios, delta design charrettes, and interactive infographic tools. The relation between tools and consent for long-term delta development is exemplified in Vietnam, as the development and application of scenarios resulted in convergence for strategic decision making. Although in Bangladesh the plan is still under development, the probe suggests that the participatory planning tools are instrumental in making a range of actors familiar with the scope and difficulties of strategic delta planning. To what extent the use of these tools, and the effectiveness of their application, can be linked to strength of the consent in planning reached, remains a subject of further study that needs to be traced over the different stages of planning.

Second, the probe has produced new insights regarding the shape and dynamics of the Hourglass. The probe shows that the three phases of strategic delta planning can be clearly identified in the studied cases. Bangladesh is in the early phase of the actual strategic delta plan formulation, whereas Vietnam has completed the MDP. The Netherlands is furthest in terms of the Hourglass framework as funding and legislation is adjusted to promote implementation. All three cases converge from agenda setting to the formulated strategic delta plan – not in the least because political actors and actions need to converge on a moment of decision. The hypothesized divergence from strategic delta plan to implementation is less clear. The Dutch and Vietnamese case studies hint that multiple steps may be needed to move from strategic delta plan formulation to implementation projects. Adjustments in funding and legislation are relevant to embed the planning process in a wider institutional context; apparently this embedment and broadening of the consent is needed before a strategic delta plan can get implemented. Consequently, a strategic delta planning process consists of numerous decision-making rounds wherein the strength of the consent can be (re)-analysed. For instance, in the Dutch case, consent for the content of the strategic delta plan may have been weak since five extra years were needed to discuss strategic options and strategies as part of the Delta Programme, eventually resulting in five Delta decisions and preferential strategies.

The probe has also touched upon the dynamics related to consent, actors, innovations and tools. Actors may indeed undertake different trajectories through the Hourglass (illustrated in [Figure 1](#)). The Planning Commission of Bangladesh seems to 'step in'

therewith strengthening the consent. In the Netherlands, the Ministry of Infrastructure and the Environment is 'stepping forward' whereas spatial adaptation actors did not manage to 'step in'. In Vietnam, the Ministry of Planning and Investment has been involved less, signalling either a 'step out' or a 'side step'. How exactly actors and innovations in various deltas travel through or along the Hourglass, and what precisely shapes the Hourglass in a delta, will be analysed in the subsequent years of our research project.

4. Discussion

We started this paper by positing that strategic delta planning is different when compared to conventional delta planning. Consent offers a useful concept to analyse the influence of strategic delta planning processes on guiding delta developments congruently towards sustainable delta development. The Hourglass framework (Section 2.2) was introduced to explore whether it provides a meaningful concept for explaining how strategic delta planning processes evolve from planning to implementation. The framework analyses how actors, innovative solutions and participatory planning tools contribute to consent for long-term sustainable delta development. The usefulness of the framework was tested through a plausibility probe. The probe has contributed in three ways to a better understanding of strategic delta planning processes.

First, the probe showed that the Hourglass framework explains how a process of strategic delta planning evolves by focusing on actor coalitions, innovative solutions and participatory planning tools in negotiating consent. As each decision-making phase (agenda setting, plan formulation, implementation) has a distinctly different political context, actor coalitions, innovative solutions and planning tools may change over time. The probe showed that new actor coalitions are formed to enhance consent for a strategic delta plan. Towards implementation, actors and strategies may step forward, step in, step out or sidestep a strategic delta plan. Different types of actor coalitions may exist (pragmatic and ideological) that have different motivations in giving consent to decisions and plans (Phi *et al.* 2015). The probe revealed that traditional solutions, like protecting polders or triple rice productions, are no longer self-evident in negotiating consent in urbanizing deltas. Different technological innovations may emerge in the planning processes (Bijker 2010), ranging from radical or extreme solutions to abstract and multipurpose solutions. The first may provide urgency and rationale for a strategic delta planning process, whereas the latter two are likely to support consent as they are attractive to multiple actors. The probe indicated that participatory planning tools are instruments in negotiating consent. Design workshops help to change the appreciations of participants from conventional to strategic delta planning and developing scenarios can result in convergence on preferred delta developments.

Second, the probe demonstrated that the Hourglass framework analyses shed light on the outcomes of strategic delta planning in terms of consent in decision-making. Decision-making takes place in rounds (Teisman 2002) of agenda setting, strategic delta plan formulation and implementation. During these rounds, consent is needed due to political decision making on a strategic delta plan, funding and legislation. In between the rounds, the Hourglass analyses can indicate whether the consent is strong and lasting, and whether convergence or divergence regarding advocated strategies for long-term delta development takes place between these rounds. The Hourglass framework can thus provide insights on the stability of consent across decision-making rounds.

Third, the framework was probed in three widely differing deltas in northern and southern parts of the world. Despite the differences in planning styles, social-economic

and cultural contexts, the cases revealed that the Hourglass framework can be successfully applied to analyse the process and outcomes of strategic delta planning processes. The Hourglass framework highlights the dynamism of strategic delta planning processes. The case analyses indicate that strategic delta planning and development is a discontinuous process of political strategic decisions, bureaucratic planning, technocratic design and societal alterations to implementation. The strategic delta plan and its implementation need to encompass this, not only across timescales (long term – short term), but also across spatial scales, to come to a congruent plan wherein problems and interests of regions are met in a politically influenced planning process. The Hourglass framework is suitable to analyze strategic delta planning initiatives in delta regions worldwide, analysing the strength and stability of consent for strategies leading to sustainable delta development. Furthermore, the framework contributes to strategic spatial planning literature as it introduces, through consent negotiations, a novel conceptual lens to explore the impact of strategic spatial planning and implementation (Albrechts 2004; Bafarasat 2014; Faludi 2000; Healey 2004). It may therefore also be relevant for master plans in relation to urban and spatial planning, climate adaptation, or integrated water resource management.

Due to the above, it can be concluded that the Hourglass framework is potentially a useful contribution to better understand the processes and outcomes of strategic delta planning processes worldwide. The dimensions of actor coalitions, innovative solutions and participatory planning tools provide useful analytical dimensions to explore how consent is negotiated. However, as the probe has produced brief and selective case analyses there are also some limitations. Consent was mainly interpreted as who is supporting the plan, yet this did not describe specifically which interests were accommodated so that actions could be taken (Checkland 2000) or which topics and people were excluded (Connelly and Richardson 2004). In addition, it was difficult to determine the stability of the consent (over time and in multiple decision-making rounds) to gain more insight on how influential strategic delta plans truly are in influencing the scope of (implementation) projects in the delta. Other limitations of the probe are that it could not be determined how strategic the plans are (Albrechts and Balducci 2013), their contribution to sustainable delta development, or in which decision-making context (e.g. power relations, democratic representation) strategic delta planning works best (Healey 2009). These valuable questions remain to be explored.

5. Conclusion and further research

5.1. Conclusion

Strategic delta planning processes set off from high ambitions, since they aim for sustainable delta development. This calls for tremendous efforts, because it requires a move away from vested ethics, interests, conventional planning paradigms and technologies. This paper has introduced the Hourglass framework to better understand how consent for the strategic delta plan and implementation is developed by focusing on actors, innovative solutions and participatory planning tools. The usefulness of the framework was explored through a plausibility probe with cases of Bangladesh, the Netherlands and Vietnam. The cases demonstrated that the Hourglass framework is potentially a valid and useful framework to analyse the process and outcomes of strategic delta planning in deltas around the world. Furthermore, the probe highlighted how consent is negotiated through pragmatic actor coalitions, generically described

Table 3. Working hypotheses on strategic delta planning.

Scope	No.	Description	References
The nature and success of strategic delta planning	1	Strategic delta planning is distinct from mainstream delta planning since it adopts a long-term planning horizon (50–100 years) for sustainable development of the delta. New, or controversial issues may be put on the ‘planning table’ since the long-term planning horizon enables actors to think differently about their interests, the main problems and solutions in a delta.	Albrechts (2004) and Albrechts, Balducci (2013) and Healey 2009
	2	The success of strategic delta planning is determined by the strength and duration of the negotiated consent for the strategic delta plan. Negotiating consent results in convergence from agenda setting to strategic delta planning and in divergence within shared bounds from plan formulation to implementation. When consent collapses in the strategic delta planning or implementation phase, the strategic delta planning process is not successful.	Checkland and Scholes (1990) and Checkland (2000)
	3	The success of strategic delta planning is also determined by embedment in the wider context as strategic delta planning moves away from sector-specific short-term plans. This requires changes in legislation and funding to craft new arrangements that support the implementation of strategic delta plans.	Albrechts and Balducci (2013) and Healey (2004)
Ways to negotiate consent in strategic delta planning	4	Two types of actor coalitions can be identified in strategic delta planning processes: natural coalitions and pragmatic coalitions. The different types of coalitions reflect a different MOTA attitude (motivation, threats, opportunities, ability) to plans and solutions.	Phi <i>et al.</i> (2015) and Sabatier and Weible (2007)
	5	Innovative solutions can contribute to negotiating consent in strategic delta planning processes when they are able to serve and align interests of different actor coalitions. This can be achieved when the innovations are multipurpose and readjustable to different contexts.	Latour (2005), Pinch and Bijker (1984) and Healey (2009)
	6	Participatory tools contribute to consent when they are tailored to the level of detail required by actors involved in a specific phase (agenda setting, strategic delta plan formulation, and implementation) of the strategic delta planning process.	Beach and Clark (2015), Goosen et al. (2014), Geertman and Stillwell (2004), Pahl-Wösl (2005) and Vonk, Geertman, and Schot (2007)

multipurpose solutions and planning tools to shape the appreciations of actors towards sustainable long-term developments in the delta. Having established the usefulness of the framework, we end the paper with areas for further research wherein the Hourglass framework is the analytical point of departure.

5.2. *An initial strategic delta planning research agenda*

Further empirical research may lead to insights for strengthening consent in strategic delta planning processes through informed actor coalitions, implemented innovations and effective participatory planning tools. The proposed research agenda (Table 3) covers 6 working hypotheses that are derived from both literature and the probe with the Hourglass framework. Hypotheses 1–3 address the nature and success of strategic delta planning hypotheses and hypotheses 4–6 cover important aspects to negotiate consent for long-term sustainable delta development.

5.3. *Further development of the research agenda*

Strategic delta planning processes cannot be studied in isolation as their context (social, economic, political, physical, and ecological) and other planning processes influence strategic delta planning. Researchers should acknowledge the influence of different stakeholders, political decision-making, social-economic concerns and technological developments on a planning process. Therefore, to get a better inside perspective it is essential that researchers engage and collaborate with practitioners in the delta planning community. Such transdisciplinary science (Pohl 2005) or knowledge co-production (Cornell *et al.* 2013), is also promoted in multidisciplinary delta research projects such as Belmont Forum Deltas and ESPA project (Brondizio *et al.* 2016; Nicholls *et al.* 2015).

We have already experienced that such collaboration contributes to more insight in the role of actors in planning processes, the strengths and weaknesses of participatory planning tools and promising innovative solutions for sustainable delta development. Also, by involving practitioners, a better connection is ensured with ongoing decision-making and delta planning processes. Lastly, by involving experts from different deltas, a more comprehensive understanding arises on the diversity in (planning) culture and governance. This generates a better understanding on how knowledge, planning approaches and innovative solutions may travel from one delta to another.

To conclude, we commit to work on the proposed initial research agenda. We invite others to contribute to this initial research agenda hoping that it will stimulate further research and discussions amongst researchers and practitioners in the delta planning community. Ultimately such research should lead to a better understanding of strategic delta planning process, and what makes them effective in establishing a strong and stable consent that guides innovations and developments from strategic policy, planning and design to implementation.

Notes

1. The command and control style of river basin planning as well as sectoral (long-term) master planning is not well equipped for the multiple problems and claims of actors in urbanising river basins and deltas. Integrated water resources management, integrated coastal zone management and integrated flood risk management have all put integration and integrated approaches high on the agenda, yet they all integrate with one specific purpose in mind (water resources, coastal zones, flood protection). This provided limited guidance on exposing

cross-sector inconsistencies in development aims and making well-balanced choices in the short- and long-term on, for instance, agriculture or industry at the delta level.

2. Consensus (building) is commonly used in conventional planning, negotiated agreements and strategic spatial planning (Innes, 1996; Faludi, 2000; Friedmann *et al.*, 2004; Susskind, McKeeman, and Thomas-Lamer, 1999).
3. We distinguish phases for analytical clarity while acknowledging that the distinctions between phases may be too theoretical as, in practice, the phases may overlap (DeLeon, 1999; Nakamura, 1987).

Acknowledgements

We thank the respondents for sharing strategic delta planning experiences and providing feedback on the Hourglass framework. We are grateful for the valuable feedback of two anonymous reviewers; their comments improved the quality of this paper. We thank prof. Pieter van der Zaag and prof. Wil Thissen for useful comments on previous versions of this paper. This research is funded by the Urbanising Deltas of the World Programme of the Netherlands Organisation for Scientific Research (NWO) under Project number W 07.69.106.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the Nederlandse Organisatie voor Wetenschappelijk Onderzoek [grant number W 07.69.106].

Supplemental data

Supplemental data for this article can be accessed here.

References

- Albrechts, L. 2004. "Strategic (Spatial) Planning Reexamined." *Environment Planning B* 31 (5): 743–758.
- Albrechts, L., and A. Balducci. 2013. "Practicing Strategic Planning: In Search of Critical Features to Explain the Strategic Character of Plans." *DISP – The Planning Review* 49 (3): 16–27.
- Arcadis. 2008. *De Delta commissie legt haar oor te luister*. Rotterdam: Arcadis
- Auerbach, L.W., S.L. Goodbred, Jr. D.R. Mondal, C.A. Wilson, K.R. Ahmed, K. Roy, M.S. Steckler *et al.* 2015. "Flood Risk of Natural and Embanked Landscapes on the Ganges-Brahmaputra Tidal Delta Plain." *Nature Climate Change* 5 (2): 153–157.
- Bafarasat, A.Z. 2014. "Reflections on the Three Schools of Thought on Strategic Spatial Planning." *Journal of Planning Literature* 30 (2): 132–148.
- BanDuDeltas. 2014. *Bangladesh Delta Plan 2100 Formulation Project: Inception Report, BDP 2100*, Dhaka: Consultant Team BanDuDeltas.
- Beach, D., and D. Clark. 2015. "Scenario Planning During Rapid Ecological Change: Lessons and Perspectives from Workshops with Southwest Yukon Wildlife Managers." *Ecology and Society* 20(1): 61. <http://dx.doi.org/10.5751/ES-07379-200161>
- Bijker, W.E. 2010. "How is Technology Made? – That is the Question!." *Cambridge Journal Economics* 34 (1): 63–76.
- Boezeman, D., M. Vink, and P. Leroy. 2013. "The Dutch Delta Committee as a Boundary Organization," *Environment Science Policy* 27: 162–171.
- Briassoulis, H. 1989. "Theoretical Orientations in Environmental Planning: An Inquiry into Alternative Approaches." *Environmental Management* 13 (4): 381–392.

- Brody, S.D., and W.E. Highfield. 2005. "Does Planning Work? Testing the Implementation of Local Environmental Planning in Florida." *Journal of The American Planning Association* 71 (2): 159–175.
- Brondizio, E.S., E. Foufoula-Georgiou, S. Szabo, N. Vogt, Z. Sebesvari, F.G. Renaud, A. Newton *et al.* 2016. "Catalyzing Action Towards the Sustainability of Deltas." *Current Opinion in Environmental Sustainability* 19: 182–194.
- Bucx, T., M. Marchand, A. Makaske, and C. Van De Guchte. 2010. *Comparative Assessment of the Vulnerability and Resilience of 10 Deltas*, Synthesis Report, Delta Alliance International. Wageningen: Delta Alliance International.
- Bucx, T., W. Van Driel, H. De Boer, S. Graas, V. Langenberg, M. Marchand, C. van de Guchte *et al.* 2014. *Comparative Assessment of the Vulnerability and Resilience of Deltas. Extended Version with 14 Deltas*. Synthesis report, Delta Alliance International. Wageningen: Delta Alliance International.
- Checkland, P. 2000. "Soft Systems Methodology: A Thirty Year Retrospective." *Systems Research Behavioral Science* 17 S1 (Issue supplement): 11–58.
- Checkland, P., and J. Scholes. 1990. *Soft Systems Methodology in Action*. Chichester: John Wiley and Sons.
- Choudhury, G., C. Terwisscha Van Scheltinga, D. Van den Bergh, and F. Chowdhury, J. de Heer, M. Hossain, and Z. Karim 2012. "Preparations for the Bangladesh Delta Plan." Alterra Report 2300, Wageningen. Wageningen: Alterra Wageningen University and Research.
- Connelly, S., and T. Richardson. 2004. "Exclusion: The Necessary Difference Between Ideal and Practical Consensus." *Journal of Environment Planning and Management* 47(1): 3–17.
- Cornell, S., F. Berkhout, W. Tuinstra, J. Tabara, J. Jäger, I. Chabay, B. de Wit *et al.* 2013. "Opening up Knowledge Systems for Better Responses to Global Environmental Change." *Environmental Science and Policy* 28: 60–70.
- Cochrane, T.A., M.E. Arias, and T. Piman. 2014. "Historical Impact of Water Infrastructure on Water Levels of the Mekong River and the Tonle Sap System." *Hydrology and Earth System Sciences* 18: 4529–4541.
- CPRA Louisiana. 2012. *Louisiana's Comprehensive Master Plan for a Sustainable Coast*. Coastal Protection and Restoration Authority of Louisiana. Baton Rouge: Coastal Protection and Restoration Authority.
- DeLeon, P. 1999. "The Stages Approach to the Policy Process: What Has It Done? Where Is it Going?" In: *Theories of the Policy Process*, edited by P.A. Sabatier, 19–33. Oxford: Westview Press.
- Deltacommissie. 2008. *Working Together with Water: A Living Land Builds for its Future*. The Hague: Ministry of Infrastructure and the Environment.
- Deltares, U.R. Wageningen, SWIRP, SWIRR. 2011. *Towards a Mekong Delta Plan: Synthesis of Water Sector Assessment*. Delft: Deltares.
- Delta Commissioner. 2014. *Delta Programme 2015. Working on the Delta: The Decisions to Keep the Netherlands Safe and Liveable*. Ministry of Infrastructure and the Environment and Ministry of Economic Affairs. The Hague: Ministry of Infrastructure and the Environment.
- Delta Commissioner. 2012. *Delta Programme 2011. Working on the Delta: Investing in a Safe and Attractive Netherlands, Now and in the Future*. Ministry of Infrastructure and the Environment and Ministry of Economic Affairs. The Hague: Ministry of Infrastructure and the Environment.
- Delta Stewardship Council. 2013. *The Delta Plan: Ensuring a Reliable Water Supply for California, a Healthy Delta Ecosystem, and a Place of Enduring Value*. The Delta Stewardship Council. Sacramento: The Delta Stewardship Council.
- Environment Agency. 2012. *Thames Estuary 2100: Managing Flood Risk Through London and the Thames Estuary*. London: Environment Agency.
- Faludi, A. 2000. "The Performance of Spatial Planning." *Planning Practice and Research* 15 (4): 299–318.
- Friedmann, J., J. Bryson, J. Hyslop, A. Balducci, W. Wiewel, L. Albrechts, and P. Healey. 2004. "Strategic Spatial Planning and the Longer Range." *Planning Theory and Practice* 5 (1): 49–67.
- Geertman, S., and J. Stillwell. 2004. "Planning Support Systems: An Inventory of Current Practice." *Computers, Environment and Urban Systems* 28 (4): 91–310.
- George, A.L., and A. Bennet. 2005. *Case Studies and Theory Development in the Social Sciences*. Cambridge: MIT Press.
- Giosan, L., J. Syvitski, S. Constantinescu, and J. Day. 2014. "Climate Change: Protect the World's Deltas." *Nature* 516 (729): 31–33.

- Hartmann, T. 2012. "Wicked Problems and Clumsy Solutions: Planning as Expectation Management." *Planning Theory* 11 (3): 242–256.
- Head, B.W. 2008. "Wicked Problems in Public Policy." *Public Policy* 3 (2): 101–108.
- Healey, P. 2004. "The Treatment of Space and Place in the New Strategic Spatial Planning in Europe." *International Journal of Urban and Regional Research* 28 (1): 45–67.
- Healey, P. 2009. "In Search of the Strategic in Spatial Strategy Making." *Planning Theory and Practice* 10 (4): 439–457.
- Innes, J.E. 1996. "Planning Through Consensus Building: A New View of the Comprehensive Planning Ideal." *Journal of the American Planning Association* 62 (4): 460–472.
- Ison, R., N. Röling, and D. Watson. 2007. "Challenges to Science and Society in the Sustainable Management and Use of Water: Investigating the Role of Social Learning." *Environmental Science and Policy* 10 (6): 499–511.
- Klijn, F., H. Kreibich, H. De Moel, and E. Penning-Rowsell. 2015. "Adaptive Flood Risk Management Planning Based on a Comprehensive Flood Risk Conceptualization." *Mitigation and Adaptation Strategies for Global Change* 20 (6): 845–864.
- Kuenzer, C., and F.G. Renaud. 2012. "Climate and Environmental Change in River Deltas Globally: Expected Impacts, Resilience, and Adaptation." In *The Mekong Delta System: Interdisciplinary Analyses of a River Delta*, edited by F.G., Renaud, C., Kuenzer, 6–46. Dordrecht: Springer.
- Latour, B. 2005. *Reassembling the Social: An Introduction to Actor-Network Theory*. New York: Oxford Press.
- Laurian, L., M. Day, M. Backhurst, P. Berke, N. Ericksen, J. Crawford, J. Dixon and S. Chapman. 2004. "What Drives Plan Implementation? Plans, Planning Agencies and Developers." *Journal of Environmental Planning and Management* 47 (4): 555–577.
- Ligtvoet, W., and J. Van Minnen. 2009. *Roadmap to a Climate-Proof Netherlands. Summary of PBL Report 500078001 (in Dutch)*. The Hague: PBL Netherlands Environmental Assessment Agency.
- Nakamura, R.T. 1987. "The Textbook Process and Implementation Research." *Policy Studies Review* 1: 142–154.
- Nguyen, K., and H. James. 2013. "Measuring Household Resilience to Foods: A Case Study in the Vietnamese Mekong River Delta." *Ecological Societies* 18 (3): 13.
- Nicholls, R.J., F.M.J. Hoozemans, and M. Marchand. 1999. "Increasing Flood Risk and Wetland Losses Due to Global Sea-Level Rise: Regional and Global Analyses." *Global Environment Change* 9 (SUPPL.): S69–S87.
- Nicholls, R.J., P. Whitehead, J. Wolf, J. Rahman, and M. Salehin. 2015. "The Ganges-Brahmaputra-Meghna Delta System: Biophysical Models to Support Analysis of Ecosystem Services and Poverty Alleviation." *Environmental Science: Processes and Impacts* 17: 1016–1017.
- Norgaard, R.B., G. Kallis, and M. Kiparsky. 2009. "Collectively Engaging Complex Socio-Ecological Systems: Re-Envisioning Science, Governance, and the California Delta." *Environmental Science and Policy* 12 (6): 644–652.
- Ostrom, E. 2007. "Institutional Rational Choice: An Assessment of the Institutional Analysis and Development Framework." In *Theories of the Policy Process*, edited by P.A., Sabatier, 21–64. Boulder: Westview Press.
- Pahl-Wostl, C. 2005. "Information, Public Empowerment, and the Management of Urban Watersheds, Environ." *Environmental Modelling and Software* 20 (4): 457–467.
- Pinch, T. J., and W. E. Bijker. 1984. "The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other." *Social Studies of Science* 14 (3): 399–441.
- Phi, H.L., L.M. Hermans, W.J.A.M. Douven, G.E. Van Halsema and G.E. Khan. 2015. "A Framework to Assess Plan Implementation Maturity with an Application to Flood Management in Vietnam." *Water International* 40 (7): 984–1003.
- Pohl, C. 2005. "Transdisciplinary Collaboration in Environmental Research." *Futures* 37 (10): 1159–1178.
- Prinsen, G., F. Sperna Weiland, and E. Ruijgh. 2014. "The Delta Model for Fresh Water Policy Analysis in the Netherlands." *Water Resources Management* 29 (2): 645–661.
- Renaud, F.G., J.P.M. Syvitski, Z. Sebesvari, S.E. Werners, H. Kremer, C. Kuenzer, R. Ramesh et al. 2013. "Tipping From the Holocene to the Anthropocene: How Threatened are Major World Deltas?." *Current Opinion in Environment Sustainability* 5 (6): 644–654.

- Rittel, H.W.J., and M.M. Webber. 1973. "Dilemmas in a General Theory of Planning." *Policy Science* 4 (2): 155–169.
- Royal HaskoningDHV, Arcadis, Rebel, UNESCO-IHE, et al. 2014. "Myanmar Integrated Water Resources Management Strategic Study: From Vision to Action." Executive report.
- Royal HaskoningDHV, U.R. Wageningen, Deltares, Rebel. 2013. *Mekong Delta Plan: Long-Term Vision and Strategy for a Safe, Prosperous and Sustainable Delta*. Amersfoort: Royal HaskoningDHV.
- Sabatier, P.A., and C.M. Weible. 2007. "The Advocacy Coalition Framework: Innovations and Clarifications." In *Theories of the Policy Process*, edited by P.A., Sabatier, 189–220, Boulder, CO: Westview Press.
- Shamsudduha, M., R.E. Chandler, R.G. Taylor, and K.M. Ahmed. 2009. "Recent Trends in Ground Water Levels in a Highly Seasonal Hydrological System: The Ganges-Brahmaputra-Meghna Delta." *Hydrological Earth System Science* 13: 2373–2385.
- Susskind, L., S. McKeeman, and J. Thomas-Lamer. 1999. *The Consensus Building Handbook: A Comprehensive Guide to Reaching Agreement*. Thousand Oaks: Sage.
- Syvitski, J.P.M., A.J. Kettner, I. Overeem, E.W.H. Hutton, M.T. Hannon, G.R. Brakenridge, J. Day et al. 2009. "Sinking Deltas Due to Human Activities." *Nature Geoscience* 2 (10): 681–686.
- Talen, E. 1996. "Do Plans Get Implemented? A Review of Evaluation in Planning." *Journal of Planning Literature* 10 (3): 248–259.
- Teisman, G.R. 2002. "Models for Research Into Decision-Making Processes: On Phases, Streams, and Decision-Making Rounds." *Public Administration* 78 (4): 937–956.
- Van Der Meulen, M.J., A.J.F. Van Der Spek, G. De Lange, S.H.L.L. Gruijters, S.F. van Gessel, B.L. Nguyen, D. Maljers et al. 2007. "Regional Sediment Deficits in the Dutch Lowlands: Implications for Long-Term Land-Use Options." *Journal of Soils and Sediments* 7 (1): 9–16.
- Verduijn, S.H., S.V. Meijerink, and P. Leroy. 2012. "How the Second Delta Committee Set the Agenda for Climate Adaptation Policy: A Dutch Case Study on Framing Strategies for Policy Change." *Water Alternatives* 5 (2): 469–484.
- Vink, M.J., D. Boezeman, A. Dewulf, and C.J.A.M. Termeer. 2013. "Changing Climate, Changing Frames: Dutch Water Policy Frame Developments in the Context of a Rise and Fall of Attention to Climate Change." *Environmental Science and Policy* 30: 90–101.
- Vonk, G., S. Geertman and P. Schot. 2007. "New Technologies Stuck in Old Hierarchies: The Diffusion of Geo-Information Technologies in Dutch Public Organizations." *Public Administration Review* 67 (4): 745–756.
- Werners, S.E., J.M. Van Loon-Steensma, and A.P. Oost. 2016. "Method Selection in Adaptation Research: The Case of the Delta Programme for the Dutch Wadden Region." *Regional Environmental Change* 16 (1): 111–122. doi:10.1007/s10113-015-0799-9.