

Projet ANR-15-ORAR-0002

DOUBT

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A IDENTIFICATION

Acronyme du projet	DOUBT
Titre du projet	Deltas' dealings with uncertainty: Multiple practices and knowledges of delta governance
Coordinateur du projet (société/organisme)	Institut de Recherche pour le Développement (IRD)
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Rédacteur de ce rapport	
Civilité, prénom, nom	Mr. Jean-Philippe VENOT
Téléphone	00855 9 666 71 300
Adresse électronique	jean-philippe.venot@ird.fr
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Si différent du rédacteur, indiquer un contact pour le projet	
Civilité, prénom, nom	
Téléphone	
Adresse électronique	

Liste des partenaires présents à la fin du projet (société/organisme et responsable scientifique)	University College London (arthur.petersen@ucl.ac.uk); University of Amsterdam (M.Zwarteveen@unesco-ihe.org) ; CIRAD (williams.dare@cirad.fr); Royal University of Agriculture, Phnom Penh, Cambodge (sam@rua.edu.kh); Irrigation Service Center, Cambodge (sophak.seng@gmail.com); Thai Water Partnerhsip (purotaganon@gmail.com); University of Osaka, Japan (morita@hus.osaka-u.ac.jp)
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B PROJECT SUMMARY

B.1 PROJECT SUMMARY IN FRENCH

Deltas et Incertitudes : Connaitre, Façonner et Gouverner les Deltas

Deltas : Objets de recherches et sites de production de connaissance

Les deltas font l'objet d'un intérêt significatif tant dans les sphères du développement international que de la recherche. Cela est notamment dû à un discours dominant qui institue les deltas comme des régions cruciales pour l'humanité (densément peuplés, les deltas jouent un rôle clé pour la sécurité alimentaire mondiale) mais souligne leur vulnérabilité sous l'effet de processus socio-naturels couplés, au premier titre desquels figure le changement climatique. La complexité des dynamiques à l'œuvre dans les deltas font de ces derniers des sites particulièrement attrayants pour le développement d'un agenda et de projets de recherches interdisciplinaires (parmi lesquels ce projet) ; les deltas sont devenus de véritables « fronts de science ». Ce projet en sciences sociales critiques avait deux objectifs : (1) comprendre les processus et réseaux qui sous-tendent le discours dominant la littérature sur les deltas et (2) produire un corpus de connaissance sur (la gestion de l'eau et des terres dans) les deltas du Mékong (au Cambodge), du Chao Phraya (en Thaïlande) et de l'Ayeyarwady (en Birmanie). Outre notre intérêt direct à mieux comprendre la gouvernance des ressources naturelles en milieu deltaïque, la production de nouvelles connaissances de terrain devait permettre d'élaborer une réflexion critique sur (1) l'émergence et le contenu des discours globaux sur les deltas et (2) les modalités au travers desquels différents corpus de connaissance sur les deltas s'influencent respectivement – nous amenant ici à réfléchir sur notre propre posture de producteur et utilisateur de connaissances.

Sciences sociales et co-production participative de connaissance

Le projet a mobilisé des méthodes classiques en sciences sociales telles que des entretiens ouverts et semi-directifs ou des discussions de groupe avec les acteurs qui façonnent les deltas : agriculteurs, pêcheurs, agents de ministères sectoriels, d'organisations non gouvernementales, d'agences de développement, décideurs politiques et chercheurs. Des méthodes innovantes de co-production des connaissances visant à identifier et comparer différentes approches d'aménagement –et à influencer ces dernières- ont été développées. Cela a pris la forme d'une co-conception (1) de scénarios d'évolution du monde agricole thaïlandais avec des agriculteurs et des agents du ministère de l'agriculture et du département de l'irrigation et (2) d'un jeu sérieux avec des agriculteurs, décideurs politiques et agents de développement afin de discuter des modalités de construction d'infrastructure de contrôle de l'eau dans le haut de delta du Mékong au Cambodge. Concevoir et mettre en place des approches de recherche participative implique des interactions directes avec divers acteurs (y compris la participation à des événements organisés en dehors du cadre du projet) et l'observation participative a nourri notre réflexion.

Ce projet a permis de nouer des relations étroites avec l'Agence Française de Développement (AFD) au Cambodge. Les connaissances produites dans le cadre de ce projet ont notamment été mobilisées pour concevoir la façon dont des infrastructures de contrôle de l'eau seront

réhabilitées dans le cadre d'un projet financé par l'AFD et mis en œuvre dans le haut delta du Mékong. De plus, l'effort de recherche interdisciplinaire va se poursuivre dans le cadre d'un projet de recherche-action, lui aussi financé par l'AFD, et visant à mieux comprendre les dynamiques socio environnementales dans le haut delta du Mékong au Cambodge.

La production scientifique du projet met l'accent sur les modalités de gestion collective des ressources, l'influence que des dynamiques transnationales ont sur des processus locaux, et les perspectives qu'offrent les approches participatives en termes de co-production des savoirs. Un numéro spécial d'*Outlook on Agriculture* s'intéresse à la place et au devenir des jeunes dans l'agriculture Thaïlandaise et un jeu sérieux, disponible librement, a été conçu pour discuter des modalités d'aménagement des plaines inondables cambodgiennes.

Paysages Mouvants du Haut Delta du Mékong au Cambodge (Crédit: Jean-Philippe Venot)



Le projet DOUBT est un projet de recherche fondamentale associant l'IRD, le CIRAD, l'*University College London*, l'Université d'Amsterdam, l'Université d'Osaka ainsi que des institutions d'enseignement supérieur et de recherche et des organisations de la société civile en Thaïlande (*Asian Institute of Technology, Thai Water Partnership*) et au Cambodge (Université Royale d'Agriculture, Irrigation Service Center). Le projet a débuté en Mars 2016 et a duré 45 mois. Il a bénéficié d'une aide de l'ANR de 449,052 Euros pour un coût global de l'ordre de 2 000 000 d'Euros.

B.2 PROJECT SUMMARY IN ENGLISH

Deltas and Uncertainties: Knowing, Practicing and Governing Deltas

Deltas as objects of research and sites of knowledge production

Deltas are high on the international development and research agenda. This is partly linked to a dominant global imagery that puts to the fore the fact that deltas are of primary importance for humankind (they concentrate a significant portion of the global population and are central to national and global food security) yet under threat, being vulnerable to a combination of coupled human and natural processes – the first of which being climate change. Deltas dynamics are presented as multifaceted, which make them amenable to the development of interdisciplinary research projects (among which this project) and position deltas as new “research frontiers” e.g. sites for the advancement of “science”. This critical social science project had two complementary objectives: (1) understanding the processes and networks that underpinned the global delta imaginary that is dominating today; (2) generate its own grounded knowledge (on land and water management) in three particular southeast Asian deltas: the Mekong (in Cambodia), the Chao Phraya (in Thailand) and the Ayeyarwady (in Myanmar). Generating grounded social-science research on specific deltas served as a way to critically reflect on global delta discourses and to highlight how these different bodies of knowledge co-shape each other rather than evolve in parallel, thus allowing to reflect on our own position as provider and user of knowledge.

Social science methods and participatory knowledge production

The project adopted conventional social science research methods such as open ended and semi-structured interviews as well as focus group discussions with multiple actors shaping land and water management in deltas: farmers, fishermen, staff from sectoral ministries, non-governmental organizations, development agencies, policy makers and other researchers. In addition, and more innovatively, the project engaged in knowledge co-production with key stakeholders, aiming at contrasting different approaches to delta’s infrastructure development and influencing these. This notably involved (1) co-designing scenarios regarding the future of agriculture in Thailand with farmers and staff from the agriculture ministry and the Royal Irrigation Department and (2) developing a role playing game to discuss modalities of infrastructure development in the Upper Mekong delta in Cambodia together with farmers, provincial decision makers and staff from development agencies. Finally, participatory methodologies involve direct engagement with a diversity of stakeholders and participatory observation (including through attendance to events organized by these stakeholders) provided key insights for the research.

This project provided a platform to engage with the French Agency for Development (AFD) in Cambodia. Knowledge generated notably informed the way future water infrastructure rehabilitation will be conducted as part of a large AFD-funded project implemented in the Upper Mekong delta. Further, it laid the basis for future interdisciplinary research engagement in the framework of an action-research project, also funded by AFD, and aiming at refining current understanding of socioenvironmental dynamics in the Cambodian Upper Mekong delta.

Scientific papers and conference talks focused on the modalities of collective management of deltas' natural resources, the influence that transnational trends can have on local processes, and the perspective that participatory approaches hold in terms of knowledge co-production. A special issue of *Outlook on Agriculture* discusses the place and future of the youth in the Thai agricultural sector and a freely available serious game has been developed to discuss modalities of infrastructure development in the Cambodian floodplains.

Shifting landscapes in the Upper Mekong Delta, Cambodia (Credit: Jean-Philippe Venot)



The project DOUBT is a research project associating the IRD, CIRAD, University College London, the University of Amsterdam, the University of Osaka as well as higher education, research, and non-governmental organizations in Thailand (Asian Institute of Technology, Thai Water Partnership) and Cambodia (Royal University of Agriculture, Irrigation Service Center). The project started in March 2016 and lasted 45 months. It benefited from a financial support of 449 052 Euros by the French National Research Agency (ANR) for a total cost of about 2 000 000 Euros.

C SCIENTIFIC REPORT

C.1 ABSTRACT

The DOUBT project (2016-2019) was a collaborative project associating IRD, CIRAD, University College London, the University of Amsterdam, the University of Osaka as well as higher education, research, and non-governmental organizations in Thailand (Asian Institute of Technology, Thai Water Partnership) and Cambodia (Royal University of Agriculture, Irrigation Service Center). This interdisciplinary research project *within* the social sciences had two complementary objectives: (1) understand the processes and networks that underpinned the global delta imaginary that is dominating today and centered on the global importance and vulnerability of these socio-ecosystems; (2) generate its own grounded knowledge (on land and water management) in three particular southeast Asian deltas: the Mekong (in Cambodia), the Chao Phraya (in Thailand) and the Ayeyarwady (in Myanmar). Generating grounded social-science research on specific deltas served as a way to critically reflect on global delta discourses and to highlight how different bodies of knowledge co-shape each other rather than evolve in parallel. The project funded by ANR adopted conventional social science research methods coupled with an analysis of historical satellite imagery and the development of innovative participatory methodologies centered on scenario development and the development of serious (role playing) games.

Taken together, research conducted in the three countries highlight that (1) the delta imaginary that dominates academic and development spheres today is actively shaped by an ever extending network and serve to legitimize a variety of interventions in different deltas of the world; (2) development aid interventions and national plans and strategies in the three study countries seldom account for local dynamics of resources access and use and overlook (purposefully or not) local knowledge and concerns, possibly leading to increased socio-environmental vulnerability; (3) current patterns of access and use of resources are the results of historical and complex strategies of resources making that come with their share of inequities. Rather than contrasting different “ways of knowing” deltas and analyzing how these hybridize as might have been initially envisioned by the team, the project, embedded in ontological discussion on the *materiality of nature*, actually enacted “the delta” as a boundary object. This allowed for a multiplicity of research avenues to be pursued but also de-facto established “deltas” as “cross-scale entities” and not solely as “specific spaces” between land and water.

C.2 CONTEXT, STATE OF THE ART, AND RESEARCH QUESTIONS

This interdisciplinary research project *within* the social sciences took as its starting point the multiple ways of understanding and dealing with society-nature interactions and calls for new forms of knowledge to plan and govern the environment that notably question the role and accountability of “experts” (e.g. Jasanoff, 2010; Whatmore, 2002). The project proposed to combine insights from Science & Technology Studies (STS) (about how science intervenes in, rather than describes, nature and politics; e.g. Haraway 1988; Law 2004) with insights from the anthropology of development and political ecology (about how knowledge and scientific accounts of environmental change and development are social constructs, happen

through, and contribute to shape power hierarchies; e.g. Mosse, 2005; Tsing, 2005 and Fairhead and Leach, 2003; Forsyth, 2003; Goldman et al., 2011).

These different bodies of scholarship were to be combined to analyze knowledge and planning dynamics in and about South and South-East Asian deltas, paying specific attention to the daily practices of knowledge production and travels. Deltas were chosen as specific objects of enquiry as they had (re)-emerged as “research frontiers” through the active works of researchers who highlighted that deltas epitomize “wicked” environmental problems and complex society-nature interactions in a context of growing uncertainty (about socio-environmental change but also about the science that studies and performs such change) (e.g. Giosan et al., 2014). This enactment of deltas as research-objects of global importance was happening together with a proliferation of networks, such as the “Delta Alliance” or the “Connecting Delta Cities”, which described themselves as aiming to find ‘solutions’ to the challenges and uncertainties faced by deltas. The project proposed to study and to engage with these networks with the explicit objective to improve the ethics and accountability of environmental planning knowledge. The use of participatory modeling activities (e.g. Voinov and Bousquet, 2010) was identified as a way to proactively engage with actors involved in delta knowledge production but activities were planned to be conducted “in-country” rather than within and with these networks.

In-depth field research was meant to be conducted in two “focus deltas”, the Ayeyarwady in Myanmar and the Chao Phraya in Thailand, while the Mekong and the Ganges-Brahmaputra deltas were meant to serve as “reference deltas” through which new knowledge produced in and about the focus deltas would be reflected upon. We quickly decided to re-center the project on South-East Asian Delta as investigating 4 deltas was too ambitious (especially given the sheer size and complexity of the Ganges-Brahmaputra). Making use of the fact that two French researchers were posted in Cambodia and Thailand, respectively, in-depth field research was primarily conducted in the Cambodian Upper Mekong Delta and the Bang Pakong river basin, adjacent to the Chao Phraya delta dominated by Bangkok. In Myanmar, field research in the Ayeyarwady delta was mostly conducted through the co-supervision of an anthropology PhD student, registered at the University of Cologne in Germany

C.3 RESEARCH APPROACH

In the three case study countries/deltas (Cambodia, Myanmar, Thailand), the research conducted by the French team and its national partners followed a similar structure and was conducted both at local and national level so as **to understand current deltas knowledges and practices**, as had been initially envisioned in the Work Package 3 of the proposal.

We adopted a diversity of social science research methods such as literature review, open ended and semi-structured interviews, focus group discussions with actors shaping land and water management in deltas (farmers, fishermen, staff from sectoral ministries, non-governmental organizations, development agencies, policy makers and other researchers), and participatory observation through attendance to “delta related” events organized by the previously mentioned stakeholders. This was coupled with the use of historical satellite imagery allowing for an analysis of medium-term changes in land use and flood and sedimentation dynamics. In addition the project engaged in knowledge co-production *via* participatory activities with key stakeholders; these activities aimed at contrasting different approaches to delta’s infrastructure development and at influencing these.

A review of the existing literature, targeted key informant interviews and landscape analysis supported studies of the policy and institutional framework of delta management at national level in the three case study countries. It also laid the groundwork for selecting specific case study areas that we deemed illustrative of specific modalities of knowing and practicing deltas and that (1) either found traction or (2) were actually overlooked in national and global discourses on delta planning and management. In Cambodia, research was conducted in the Takeo and Kandal administrative provinces both in the Upper Mekong Delta; in Myanmar, research focused on the “Nyaungdone Island” of the Ayeyarwady delta; in Thailand, we not only looked at the rural Chao Phraya delta but also decided to ‘decenter’ the research and study (1) the low lying Bang Pakong Basin and (2) Bangkok. This provides the ground to reflect on what ‘makes’ the specificity of deltas –a question that underpinned the overall research project (the case study areas are further described in C4).

In each of the case study areas, and given that the experience of the French team members related to water governance and agriculture, the research first aimed at understanding local practices of natural resources management and agricultural systems. We paid specific attention to identifying and deciphering instances of collective action. This “diagnosis” phase laid the ground for developing participatory research activities that would generate yet another corpus of knowledge on deltas and, in the process, enacted these in specific ways. We had initially envisioned to adopt the same participatory approach, grounded in the Companion Modeling principles (Etienne, 2011), in all case study areas so as to analyze the extent to which and how specific delta contexts shaped knowledge generation dynamics within participatory process. Engagement with the partners of the project made us realize that “Methods of Knowing” and “Content and Context of Knowledge” are closely intertwined (as shown, among others, by Law, 2004) and that the initial idea we had to infer causal relationships between “delta context” and “participatory processes” on the basis of differences observed within a comparative framework did not hold. This meant that the participatory approaches designed in Thailand and Cambodia resulted from– as much as they constituted the methods of- research conducted in these case study areas, also reflecting the particular interests of members of the research teams involved in these countries. In Thailand, and echoing practices widely used in delta planning exercise (e.g. MDP, 2013), participatory activities consisted in co-designing scenarios regarding the future of agriculture in Thailand with farmers and staff from the agriculture ministry and the Royal Irrigation Department. In Cambodia, the choice was made to design a role playing (serious) game to discuss modalities of infrastructure development in the Upper Mekong delta together with farmers, provincial decision makers and staff from development agencies. Though the participatory methods are different, they have in common to “abstract” stakeholders from their “ground reality” (through anticipation –scenario- and/or placing them in a virtual world – serious game); the underlying hypothesis being that this can help inducing knowledge and viewpoints that are otherwise not voiced (see the discussion).

C.4 RESEARCH RESULTS

In Myanmar, we conducted a study of the history of land and water development in the Ayeyarwady delta (Ivars and Venot, 2019). Infrastructure development in the Ayeyarwady Delta shares many similarities to that of other deltas of Southeast Asia. It mostly consisted in the construction of flood control infrastructure and large-scale land reclamation projects such as polders. This is partly linked to the fact that the delta has always been enmeshed in global

development and knowledge networks and, as such, has been partly shaped by outside events and foreign actors despite the political turmoil the country went through since its independence in 1948. The study also shows that the Ayeyarwady delta has recently emerged as a *new frontier* for delta science and delta planning as Myanmar is going through a far reaching political transition and literally swarmed by development agencies. Making use of the concept of boundary object (Star and Griesemer, 1989), we analyzed how the Ayeyarwady delta is enacted as what we call a “global delta”, that is, an entity of broader relevance that would lend itself – and even require – generic research and governance approaches and their critique. Dutch international development aid, supported by Dutch higher education and research organizations and Dutch consulting companies, play a key role in such process as it did for other delta worldwide (Mekong and Bangladesh for instance). The establishment of the Ayeyarwady Delta as a “global delta” notably happens through the elaboration of a suite of “knowledge artefacts” (delta vision, delta strategy, scenarios, etc.) that aim at creating *interessement* (Akrich et al., 2002) among an ever wider diversity of agents. The establishment of a supportive coalition is needed to establish the delta as a policy object but also leads to depoliticizing development. The “global delta” sets the scene and agents in the coalition make use of its malleability to push specific agenda that will leave their mark on the delta’s landscape as has been the case over the last 150 years.

Research at local level in Myanmar further engage with the idea of the delta as a *frontier* through two case studies: (1) Nyaungdone Island (Ivars and Venot, Submitted) and (2) a comparison of socio-environmental land dynamics in three alluvial sites along the main stream of the Ayeyarwady River (writing in progress). Rather than seeing natural resources as a “given”, we show how they have actually been “made” through socially embedded resource-making strategies that have long led to large-scale dispossession and marginalization of small-scale farmers and fishermen. Land and fishery reforms that have been initiated since 2011 and the transition to civilian governments are the most recent attempts at resource-making. They have certainly triggered significant resources re-allocation but existing cross-scale patronage networks still largely shape how these re-allocations take place in practice, generally to the benefit of local elites who have maintained their powerful position through relationships of capital accumulation and indebtedness. The research also shows that, in such deltaic environment where resources are part water, part land, part rice, part fish, and can disappear or appear from one year to another, and the legitimacy of one’s claims often hinges on proving prior use of a specific resource, it is the nature of the resource to be accessed and (re)distributed that is contested in itself. Different resources making-strategies enact the delta as a frontier, or rather, as several co-existing frontiers. First, the delta can be seen as a frontier in the sense that claims and counterclaims to access and use resources encounter each other and the State still attempts to exert its control over the area. Second, it is the resources and institutional fluidity that is in itself a frontier that multiple agents try to navigate to express and legitimize their claims: the materiality of the resources and knowledge artefacts (such as official letters, maps and figures) play a key role in shaping the outcomes of such navigation.

In Cambodia, the Mekong “delta” is rather conspicuous by its absence both in policy documents and in the academic literature though the delta hydrographically “begins” by Phnom Penh where the river first branches out and the Bassac River flows roughly parallel to the Mekong mainstream for about 70 km before both rivers cross the border and continue their journey towards the sea. While the Mekong delta has been associated to Vietnam (e.g.

MDP, 2013), in Cambodia, academic and development attention in the water sector is focused on the Tonle Sap Lake (largest freshwater lake in South East Asia supporting one of the most productive inland fisheries in the world) that has come under multiple pressure. Our research somehow reflected this situation as we chose to focus on analyzing (1) grounded collective instances of natural resource management and (2) the sociotechnical dynamics unfolding around a specific type of infrastructure called “preks” in the framework of a water control infrastructure rehabilitation project. The delta was “present” in the research in as much as the case study sites were indeed located in the hydrologically-defined delta but research questions and activities were formulated in relative isolation from “global delta debates” as they had been identified in the proposal and as they were highlighted in the research conducted in Myanmar. Research was conducted in two Cambodian provinces.

In Takeo province, the research was grounded in well-known debates regarding the sustainability of irrigation investments and the role that Water User Groups (locally called Farmer Water User Community) can have in ensuring it (see, for instance, Suhardiman and Giordano, 2014). Unsurprisingly, and as observed in many countries, the research highlighted the lack of willingness of the Cambodian irrigation administration to truly devolve decision making responsibilities to irrigators and the priority it gave towards building new infrastructures and conducting large-scale rehabilitation rather than supporting routine maintenance. This has several reasons among which (1) the visibility that new water control infrastructures provide to a government that seeks electoral support from its rural base, (2) the fact that it constitutes a modern re-enactment of the grandeur of Angkor and (3) the opportunities it provides for personal enrichment (on the topic of irrigation management in Cambodia, see also Ivars and Venot, 2018; Blake, 2019). Maybe more interestingly, the research highlighted that far from being embedded in a duality between the irrigation administration and water user associations, irrigation management in the Takeo floodplains was the result of an “institutional bricolage” (Cleaver, 2002) and that farmers-cum-entrepreneurs owning diesel pumps played a key role in shaping access to resources (canal infrastructures and water) and deriving significant surplus from it including through land purchase. This happens in a context whereby the low profitability of paddy directly exported to Vietnam and still unreliable access to water has pushed a significant number of small-scale farmers into debt.

In Kandal province, research focused on collective fishery management and socio-technical relationships unfolding around specific pieces of water control infrastructure: the preks (e.g. irrigation and drainage earthen channels dating back to the colonial period). In Kandal, fishermen groups (called Fishery Communities) were established in the mid-2010s following the dismantlement of private fishing concessions and in relation to an electoral promise. Members of the group can fish for self-consumption and the group is responsible for preserving the (fishery) resources notably making sure there is no illegal fishing activity conducted in the area it is meant to oversee. Fishery communities in the Upper Mekong Delta, however, are granted the right to engage in commercial activities from the fishery administration. In some cases, fishery communities have devised innovative ways to deal with uncertainty in hydrological regimes and related fish catch and distribute risks and benefits in an equitable way among their members. In other cases, middlemen who provide the initial capital to build the fishing systems reap the most benefits (as holder of concession rights did 10 years ago). In all instance, fishery communities face difficulties to control widespread small-scale illegal fishing activities and are under pressure from the fishery,

police and administrative authorities, which divert up to half the fishing revenues. The research also shows that the dismantlement of the private fishing concessions led to (mostly non-official) large scale land use change (from natural vegetation to agricultural land for maize and rice cultivation). This, together with changes in the flood regime of the Mekong, leads to a significant decrease in the size and productivity of fishing grounds that mostly affect the most vulnerable households who belong to the Cham (Muslim) minority, often lives on boat and roam the floodplain, “following the fish”.

Our focus on collective fisheries and the low lying wetlands of the Upper Mekong Delta allowed to shed a different light on current development projects aiming at rehabilitating “preks” so as to intensify agricultural systems. This laid the ground for developing a serious role playing game to discuss modalities of infrastructure development and trade-offs attached to these, this time at regional level. Here, the Upper Mekong “delta” came back and we enacted it as the specific area where preks can be found. The participatory workshops implemented stressed the in-depth knowledge that local inhabitants had of the multiple and complex socio-environmental interactions at play in this area, the diversity of local agendas and interests, and the relative lack of influence they had on the nature and implementation modalities of development projects in the area. The workshops also highlighted that this type of knowledge was somehow lost (or ignored) in other spheres whereby international experts and staff from the ministry in charge of the water portfolio mostly mobilize engineering and project management knowledge to design and implement a generic approach that centered on the construction of water control infrastructures for agricultural intensification. The serious game sessions put to the fore this discrepancy and the need to “hybridize” these multiple understanding and enactments though the ability of the tools we developed might be limited in terms of allowing agents to explore “alternative futures” (participants to the workshops indeed expressed the need for the tools we used to be “spatially grounded” as opposed to representing a virtual space, and discussion very much revolved on existing pieces of infrastructures and projects).

In Thailand, the study of institutional change in the Thai water sector (2000-2020) was grounded in a political ecology perspective interrogating the networks and associated knowledge apparatus that shaped successive sector’s reforms. It highlighted a gradually fading influence of international development and knowledge brokers such as the World Bank and the Asian Development Bank, though “international” buzzwords and principles such as Integrated Water Resources Management (IWRM), apex bodies, water user groups, participatory management, and user-and/or-polluter-principles are now embedded in policy and legal documents. These “pile-up” and form a suite of potential legitimacy frameworks that can be called upon if they happen to be in line with desired water interventions that are still very much oriented towards the construction of infrastructures (such as the Water Grid, inter-basin transfers, dams, flood protection works). The study also showed that water policy debates are influenced by a small number of Thai academics embedded in global knowledge networks. These individuals are called upon to provide “expert opinion” and generally make the pro-active choice to only engage with technical matters that do not question broader governance choices and structures so as to maintain their position. Here, knowledge is willingly reduced (both by knowledge users and providers) to its expertise dimension and depoliticized. As is often the case it is then selectively used if it happens to support choices that are primarily made to meet powerful intertwined economic and political interests, while in the opposite case it is ignored (and potentially not even voiced).

In complement to this national level analysis, three specific case studies were conducted. The first took as its starting point broader questions regarding the persistence and future of farms (e.g. Rigg et al., 2016) and the issue of ageing farmers (Rigg et al., 2019) in south-east Asia. The research highlighted the uncertain future of rice farming in the Bang Pakong basin (Faysse et al., 2020) but also the interest that some youth have in pursuing their parents' activity (who have shifted from rice to more intensive aquaculture production for instance) given its profitability and existing perspectives of diversification –hence hinting at the possibility of further land concentration. The research also highlighted (1) a risk of de-skilling as youth seem to favor non-agricultural training and (2) a discrepancy between existing dedicated support to young farmers (based on an “ideal-type” of farm officially popularized) and youth aspiration and needs (such as support for initial capital investment and agricultural knowledge) (Ruiz-Salvago et al., 2019; Phiboon et al., 2019). Knowledge co-production took place through a participatory scenario design process with farmers and staff from local administrations and public agencies. Scenarios about the likely and desirable trends in the agricultural and water sectors for the 2020 horizon were designed and discussed. Trend analysis and scenario discussion opened the way to discuss multi-level initiatives that could lead to sustainable farming, and notably facilitate the involvement of a new generation in the agricultural sector. Results of this work underlined the need for a much stronger integration between visions of the future of water management, visions of the future of agriculture, and visions of the future of rural areas in Thailand. This work is a reminder that concepts such as “deltas” shape our understanding of place and in consequence the type of research that is conducted in and about these places. Since 2011, discussions around the Chao Phraya are mostly concerned with (protection from) floods and the prominence of Bangkok; agriculture is largely left in the shadow. The explicit choice made to take some distance from the concept of “delta” and rather focus on “agriculture” actually allowed us to shed light on some delta's realities that remain largely overlooked. The delta took, however, center stage in the two other case studies: (1) the “monkey cheek” as flood retention mechanisms and (2) the *Chao Phraya River promenade* in Bangkok.

The study of the “monkey cheek policy” (that aims at using low-lying areas to divert floodwaters and reduce floods downstream) is illustrative of the limits of participatory approaches implemented by the Royal Irrigation Department (RID) and of the symbolic power of the King who had endorsed the idea in the late 1990s. In a context whereby the 2011 Bangkok floods are commonly presented as a reminder of the vulnerability of the Thai capital, the research indeed shows that little attention is paid to (potential and seldom expressed) dissent by farmers during the design and implementation of projects. The projects are meant to follow a participatory approach but the research highlights that participation is largely based on bureaucratic and administrative representation and that farmers consider they do not have enough information to assess the relevance of projects they are meant to be part of (Trakuldit and Faysse, 2019). Implemented in a rather top-down manner in the name of the “necessary sacrifice of farmers for the protection of the nation”, monkey cheek projects actually consist in enforcing rigid rice-cropping calendars and related water distribution schedules; these do not account for the diversity of rice cropping practices and the complex circulation of water in the Chao Phraya floodplains (Molle et al., submitted). Enhanced control also means that a “contract” between the RID and the farmers is actually established (consisting in the protection of crops and/or a compensation for the loss of crops due to controlled flooding). This happens even though (1) the flexibility of the “delta system” in the

face of ever changing flood patterns is actually undermined rather than enhanced by the rigid schedules enforced and (2) as a consequence the RID is not in a position to respect the contract thus creating potential tensions that did not exist earlier.

The 2011 Bangkok floods constituted a recent “landmark (sic)” in discussions over the sustainability of the megalopolis and its relationship to the Chao Phraya delta, which is also embedded in the debate taking place about the *Chao Phraya promenade*. Presented as a way to act the entrance of Bangkok in the realm of the modern (Asian) megalopolis by the military government and its proponents within the Bangkok Metropolitan Administration, the project was disputed on multiple grounds such as (1) its disconnect with a city that would be “aquatic” or “amphibious”; (2) a disregard for current and multiple modalities and rights to access the riverside; (3) a lack of participation of relevant constituencies during feasibility studies; (4) the risks it implied in terms of flooding in a context of sea level rise and larger floods; (5) suspicion that it would lay the basis for the construction of yet another highway, etc. Thai architects of Chulalongkorn University played a key role in structuring opposition to the project and laid the basis for the emergence of a Bangkok-based civil society that seeks to publicize issues of access and use of public space within the city, beyond the case of the *promenade*. There is nothing exceptional in the disputes and multiple encounters around the *promenade* – most urban projects of this size involve similar dynamics. What is interesting though is to see how different actors enact the project in different ways (as in the case of the Cambodian preks), which triggers a “game of scale” whereby the *Chao Phraya promenade* allows discussing other space: (public spaces) in Bangkok, the deltas, temples, malls, etc.

C.5 RESEARCH OUTCOMES

The project led to peer reviewed articles in academic journals as well as presentations in international conferences (see section D for a detailed list). A website (deltasoutheastasia-doubt.com) was developed to present the activities and results of the work package 3 of the DOUBT project in Cambodia, Myanmar, and Thailand. The website presents the main themes and findings of the research in 4 languages (English, Khmer, Burmese, and Thai) and serves as a repository for publication and presentations produced as part of the project.

Further, in Cambodia, research was implemented in parallel to activities funded by the French Agency for Development (AFD) and notably consisting in the rehabilitation of water control infrastructure (Preks) by the Ministry of Water Resources and Meteorology in Kandal province. As highlighted in section C.4, part of the research shed light on these practices and how they reflected particular understandings and constituted specific enactments of the Upper Mekong Delta. As a result, research activities informed the design of another AFD-funded project implemented from 2020 onwards in the province. The research contributed to revisiting the approach envisioned for water control infrastructure rehabilitation which will notably (1) give more space and opportunities to local inhabitants to share their knowledge of the prek environment *before* infrastructures are designed and built by the project team, thus offering an opportunity for local proposals to be included in project’s activities and (2) envision each prek as part of a complex network of interconnected drains, canals and wetlands (rather than as independent canals), thus opening up the possibilities in terms of infrastructural interventions beyond what has been done over the last few years. Whether new ideas and knowledge embedded in the “project approach” (e.g. project documents and the understanding some project staff have) will lead to a different materiality in the Upper Mekong delta remains to be seen given the constraints inherent to implementing

development projects. The fact that research on these topics will continue as part of another 3 years action-research project, also funded by AFD and in the context of which a PhD focused on understanding the complex socio-hydrological dynamics of the prek region will be conducted (see section D), increases the chances that knowledge generated in the DOUBT project will indeed be used and materially inscribed in the Upper Mekong delta.

C.6 DISCUSSION

This critical social science research project aimed at questioning and contrasting different “ways of knowing” south-east Asian deltas. Against this background, this discussion provides a reflexive analysis of the research activities we conducted, framing them as yet another illustration of researching and knowing deltas. This discussion should be read bearing in mind our own positioning, that of foreign researchers working in research *for* development institutes *in* the countries where we conduct research, which notably singles us out vis-à-vis the Dutch, Japanese and UK partners of the DOUBT project. This implies a certain level of engagement with the “real world out there” on our part, which notably transpires by our choice to adopt participatory research methodologies that seek at influencing practices in ways we consider just and sustainable. This engagement is *de facto* grounded in a recognition of the *materiality of nature* (e.g. what could be called the ‘physical environment’ which, in the case of this project, was “the delta”), which we posit is shaped through interactions with networked agents but whose *existence* does not hinge on these interactions, nor does it become plural *through* different socio-natural configurations. Such positioning was not shared by all members of the research team and ontological differences on this question proved difficult to bridge. Initially centered on “what made a delta” and whether what was at play was a co-existence of *perceptions about* deltas or *of* deltas themselves (when talking of a specific place/space), some of the discussions we had with academic project partners shifted toward “preks” as specific pieces of water infrastructure and the fact they were not only *perceived* differently but *enacted* differently – the notion of enactment allowing to build a bridge between two different ontological positions (at least as expressed/embodyed by specific researchers). A collaborative paper is under way and the shift of the discussion from “the delta” to “the prek” may be an indication of the importance of “grounding” this type of debate around “bounded” material objects (the materiality of the prek – a earthen drainage canals used for multiple purposes- being maybe easier to grasp than the materiality of a delta). This idea echoes the argument of Riaux and Massuel (2014) who see in a “common field site” a key element to building interdisciplinarity.

The primary objective of the work package 3 of the DOUBT project was to “understand embedded present day delta knowledges and practices” and more specifically how delta’s rural environments were shaped through agricultural and water management knowledges and practices, development projects, national strategies, programs, and policies, and the complex ways these interplay. Section C.4 indeed highlights some of these realities and the research we conducted can be said to constitute “delta knowledge” (notably because it engaged with deltas as “specific space” and/or with academic debates on deltas). What also emerges from our activities, however, is the fact that the project enacted “the delta” as a boundary object (in quite a similar way than development organizations involved in delta planning activities do – Ivars and Venot, 2019), allowing us to ask a suite of specific research questions relating to different aspects of this boundary object. Some research activities related to the delta in “spatial terms” (field sites being located in hydrologically defined

deltas), some related to global debates that have long driven infrastructure interventions in delta (e.g. flood mitigation or agricultural intensification), some to both, and finally others did not relate to “the delta” in any explicit way (youth farmers; the interplay between development agencies and governments) but yet contributed to shedding light on it. This notably shows that “deltas” can be seen and defined not only as “specific spaces” between land and water but also as “cross-scale” entities shaped by cross-scale dynamics – the “travels” of western delta knowledge and expertise being only one of these dynamics, possibly less influential than the project initially envisioned (and, indeed, these “travels” were seldom analyzed as such). Another way to frame this is to say that *the research we conducted is what made the delta*. Whether researchers then decide to talk of multiple *perceptions* or of multiple *realities* has, then, more to do with whom they want to engage with than anything else: it says more about the researchers than about the deltas.

A last point then deserves specific attention in this discussion on knowledge generation dynamics. It relates to the initial normative objective of the project (i.e. improving the *ethics* and *effectiveness* of environmental knowledge for actual planning processes as expressed in the project proposal). We translated this normative objective in a methodological choice, the use of participatory research methods centered on scenarios development and the design and use of serious (role playing) games. We actually share the use of such methods with academics involved in developing strategic delta plans (though the processes we steered explicitly targeted people who rarely express their views in planning exercises and involved less people). Section C.4 shows how the participatory activities allowed the expression of viewpoints that were rarely expressed, hence contributing to the normative objective of the project to a small extent. The methods we used also have in common the fact that they put participants in an “in-between” that is neither “the real” nor “a virtual” world (in Kandal, the game did not represent the delta, yet it represented it). These instances of participation can contribute to generating new (ethical and accountable) environmental knowledge in the sense that they provide opportunities for producing hybrid knowledge. Participants navigate the blurred boundaries that these arenas offer in their own terms, picking elements from the real world to engage with the virtual and vice-versa, often expressing ideas and viewpoints and acting in a way they would not otherwise (though the boundaries of the arena remained, in our case, externally defined in what constitute an instance of “engineered participation”). Dynamics that unfold in the game can later be translated in “the real world” as observed when agents of the Non-Governmental Organization who partnered with researchers in Cambodia actually de-constructed the game that had been designed to discuss modalities of infrastructure development in Kandal and re-constructed it to discuss water sharing in an irrigation scheme in another Cambodian province (from their own initiative), and are likely to further “re-do” the game to discuss water management in selected preks in Kandal province. This is maybe at this point that our own positioning as outsiders providers of knowledge comes to the fore the most; our influence in shaping deltas being however limited as we encounter local practices and development structures.

C.7 CONCLUSIONS

N/A. See the discussion.

C.8 BIBLIOGRAPHY

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