



Irrigated land tenure in Cambodia
What are the perspectives for smallholder farmers?

Final study report

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List of abbreviations

ADB	Asian Development bank
AFD	Agence Française de Développement
CAVAC	Cambodia-Australia Agricultural Value Chain Program
COSTEA	Comité Scientifique et Technique Eau Agricole - <i>Scientific and Technical Committee on Agricultural Water</i>
CTFD	Comité Technique Foncier et Développement. <i>Technical Committee for land tenure and Development</i>
DS	Dry Season
EIA	Environmental Impact Assessment
F	Flooded
FWUC	Farmer Water User Community
GIS	Geographic Information System
LA-SSP	Land Administration Sub-Sector Program
JICA	Japanese International Cooperation Agency
MoWRaM	Ministry of Water Resources and Meteorology
MLMUPC	Ministry of Land Management, Urban Planning and Construction
MAEE	Ministère Français de l'Europe et des Affaires Etrangères. <i>French Ministry of Europe and Foreign Affairs</i>
MFI	Micro-finance institutes
MoEF	Ministry of Economy and Finance
MoE	Ministry of Environment
NF	Not Flooded
PRASAC	Programme de Réhabilitation et d'Appui au Secteur Agricole du Cambodge
RS	Rainy Season
SLC	Social Land Concession
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

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Executive summary

This report presents a study conducted between March 2000 and May 2022 that examines land tenure issues revolving around irrigation systems in Cambodia. It is part of the knowledge production efforts of COSTEA. It includes: i) a description of the irrigation systems characterized according to their biophysical environment and agricultural production outcomes, ii) an overview of land tenure regimes in irrigation contexts, iii) the institutional framework governing irrigated land tenure and the way it is implemented, iv) five cases studies that illustrate how irrigation intersects locally with agrarian change, and v) a discussion on key themes in irrigated land tenure.

Diversity of irrigation systems

The mapping of irrigation systems across the country reveals a large diversity of schemes depending on the size of the infrastructure and command area, the type of control over water, the influence of flood or the seasonality of agricultural production. To simplify, we established a typology of irrigation systems, as follows (by descending order of irrigated area):

- Systems of water diversion from river or reservoirs with a nested hierarchy of canals allowing for gravity-fed irrigation located in the non-flooded part of the Tonle Sap hydrographic region;
- Built-up systems based on the control of floodwater for recession agriculture located in the annually flooded area of the Mekong-Bassac hydrographic region (including prek);
- Small-scale water diversion systems or pumping systems located in the non-flooded Mekong-Bassac Southern region;
- Systems with limited infrastructure developed for recession agriculture in the seasonally flooded areas of the Tonle Sap hydrographic region;
- Small-scale water diversion or pumping systems located in the non-flooded Northern Mekong region.

The legal framework: The theory and the practice

According to the Land Law, legal possession of land that qualifies for titling must be based on occupation that started before 2001. Most of the land in command areas falls into this category. As such, it is eligible for titling and is not under acute threats (e.g., grabbing, encroachment, etc.). However, tenure security of land located in command areas resulting from recent agrarian expansion, particularly in flooded areas, is more difficult to attain through the formal apparatus. For this land, the actual security of tenure is contingent on local recognition and social arrangements.

This legal provision instating a cut-off year (2001) to include or exclude farmers from full recognition and formalization of their land rights is also highly problematic in cases of expropriation. As the Land Law does not protect individuals who are not considered the rightful owners, the farmers who have acquired (irrigated) land after 2001 are potentially left behind when it comes to compensation.

In addition, the problem lies with implementing the legal framework, not with its content. For instance, there are no clear mechanisms to regulate land markets and limit land accumulation. This could be an issue as land located within a command area is usually subject to intensive land transactions. Another issue concerns Environmental Impact Assessments that are required for irrigation systems larger than 5,000 ha. The individuals carrying out the EIA are paid by the company that submits the projects, leaving the door open for biased results and conflicts of interest. Another problem is the delay needed for approval at the MoE. This can extend to one year, well beyond the 30-day timeframe foreseen in the sub-decree. So, very often, the project starts without considering the conclusions and recommendations of the EIA report.

Irrigation and the management of fisheries resources

Despite their interconnectedness, the irrigation, agricultural water and fisheries sectors are not very well integrated. The cancellation of fishing lots in 2012 has incentivized the development of irrigation and agrarian expansion which impacts the activities of small-scale fisheries. The

expansion of irrigation has also had an impact on Community Fisheries management, particularly during the dry season when water is concomitantly needed in natural ponds for fish growth and for irrigated rice production in the surrounding areas. None of these issues are really addressed comprehensively in any policy document. The development of aquaculture may add further complexity to the multi-functional management of wetlands as it may fuse directly with irrigation systems.

Donors and institutional coordination

All donor organizations and their technical partners involved in supporting irrigation have their own due diligence guidelines to conduct feasibility studies, assess environmental and social impacts and, if necessary, manage expropriation and issue compensation. The government need to abide by these guidelines to receive donor funding, and these tools are, to some extent, harmonized with the legal framework of the country.

With the exception of AFD, however, we note that land issues are poorly integrated in these guidelines. There are no clear indications as to how existing land rights should be identified, or secured, or what mechanisms are to be followed if land within the command area is classified as State land or how to monitor land transactions during and after construction. Addressing land issues is usually avoided or assigned to local authorities and the cadastral administration. In any case, identifying land rights, securing them and addressing conflicts is not a prerequisite for developing irrigation.

Despite various attempts to coordinate this work with the cadastral administration at the Ministry of Land Management, Urban Planning and Construction (MLMUPC), the experiences have not been very successful so far. Similar coordination problems are reported with the Ministry of Environment (MoE) as they relate to environmental impact assessments.

Case studies

We have conducted five case studies to understand how the land issues identified and explained above play out in the local context. We examine irrigation investments through the prism of agrarian change.

- Irrigation intensifies a process of social differentiation between smallholder farmers through mechanisms of resource commodification, debt management, and land distress sales. Irrigation reinforces land accumulation among well-off farmers and increases wage labor for those who go under. Wage labor relies increasingly on job migration as agricultural mechanization replaces farm labor. Land concentration is also driven by external land investors who buy up land from, and rent it out to indebted farmers.
- In wetland areas, the lack of coordination between unregulated post-lot fisheries management and irrigation development has contributed to accelerating the collapse of capture fisheries and the role that Community Fisheries play in it.
- The trade-offs between the development of irrigation-agriculture and environmental conservation in wetlands are poorly addressed. And, given the political ecology context geared towards the increase of agricultural production, the protection of flooded forests for fish spawning is at risk. Recent efforts by the government to protect the Tonle Sap flooded forest are a positive sign, but there remain questions as to how these efforts are coordinated from a territorial perspective, i.e., with stakeholders involved in the agriculture, irrigation, and fisheries sectors in the Tonle Sap floodplain.

Recommendations

The institutional analysis and lessons learned from case studies inform a discussion around four key themes in irrigated land tenure: land tenure security; expropriation and compensation; land markets; and the multi-functional management of wetlands. From there, we formulate two sets of recommendations to enhance land security and promote irrigation in a territorial approach that recognizes trade-offs with other sectors and activities.

Introduction

Context of the study

Since the late 1990s, the French Development Agency (AFD) has supported the development of the irrigation sector in Cambodia (Venot & Fontenelle, 2015) and more recently in Myanmar. In addition to significant technical assistance, AFD provides institutional support for the development of public policies related to irrigation.

In 2013, to capitalize on these experiences and others implemented in other regions, AFD created a Scientific and Technical Committee on Agricultural Water (COSTEA), which is coordinated by the French Association for Water, Irrigation and Drainage (AFEID). COSTEA *brings together a diverse community of experts and aims to contribute to improving the effectiveness of irrigation policies and projects. It is a place for sharing experience and knowledge, which is open to anyone interested in taking part in a reflection about how French actors and their partners in the South support the development and implementation of irrigation policies and projects*¹.

As part of its knowledge management strategy, COSTEA has identified the issue of irrigated land tenure as an important field of research. A significant study on the subject was conducted in West Africa - in the context of the Sahel Irrigation Initiative (Hochet, 2015) - and COSTEA wishes to renew the initiative in the Mekong region where AFD is active i.e., Cambodia and Myanmar. The idea is to better understand land tenure challenges² that affect irrigation projects and to propose an analytical framework that could inform the design of AFD supported irrigation projects.

Given the topic addressed, the results will be discussed with the Technical Committee on Land Tenure and Development (CTFD) of the French Cooperation, which has worked for more than 15 years under the auspices of the French Development Agency (AFD) and the French Ministry of Foreign Affairs (MAEE). The authors of the study will receive scientific support from the CTFD and, in return, the study informs the thinking of the CTFD around irrigated land tenure.

Objectives of the study

This study primarily aims to understand how land issues play out in a variety of irrigation situations in Cambodia, how these issues affect land and resources tenure security of smallholder farmers and to what extent these issues are accounted for in the design and implementation of irrigation projects. More specifically, we aim to produce an analytical framework to address land issues raised by irrigation projects and the way in which actors respond to them in practice. On that basis, we offer several recommendations to improve the inclusion of land issues in the design of irrigation investment projects in ways that align with a pro-smallholder farmers agenda.

Scope and structure of this report

The present report is a synthesis of the entire research project. It is structured as follows:

In section 1, we discuss land tenure dynamics in Cambodia as they relate to irrigation development and agrarian changes. In section 2, we characterize the diversity of irrigation contexts in Cambodia by establishing a typology of irrigation systems, based on agro-ecological variables concerning the context in which irrigation systems are located. We also specify land tenure issues relating to each type. In section 3, we present a more detailed analysis of the institutional framework governing irrigated land tenure. The discussion is articulated around five key themes including a review of the current legal and institutional framework, its limitations and how it is implemented in practice. Section 4 is entirely dedicated to five case studies conducted across the country to find out how the land tenure issues identified above play out in local

¹ <https://www.comite-costea.fr/le-costea/qui-sommes-nous>

² E.g., access to land, land reconfiguration, the recognition of land rights and land tenure security

political ecology contexts. In the section 5, we discuss the lessons learned from the case studies in light of the key themes of irrigated land tenure that emerged in the legal-policy analysis.

1 Land tenure regimes in irrigation contexts: a quick overview

In this section, we present a short discussion on key land tenure dynamics in Cambodia and how they relate to the development of irrigation and agrarian change across the country. This includes an overview of the main dynamics of land use change and the legal pluralism that characterizes each land tenure regime.

1.1 Land ownership: private versus State land domains

In Cambodia, full legal private ownership today can originate from possession rights (*paukeas*) on State [private] land that qualifies for full ownership under the 2001 Land Law (as well as from sales and donations of State private land by the State or swaps with the State). Under the 2001 law, possessors are people who started occupation of State [private] land in ways that were open, peaceful, continuous, and recognized by local authorities. Once the occupation had lasted for at least five years, the possessor was entitled to ownership. This is the legal basis for the provision of land titles by the cadastral administration under the Land Administration Sub-Sector Program (LA-SSP). However, the 2001 Land Law does not allow possession to be based on occupation that starts on or after the effective date of the Law in 2001 (Articles 30 and 31). This means that the practice of clearing and temporary occupation leading to legal possession that existed in the 1992 Law is no longer allowed. In other words, any piece of land cleared after 2001 is not eligible for titling according to the current Land Law institutions. In practice, the cadastral administration adopts a flexible and negotiated approach when titling but the difference between the formal institution and practice is central here so that all land not cultivated as of 2001 is considered *de facto* as State land.

As far as land titling is concerned, the year 2001 (and specifically August of that year) is a turning point as agricultural land cultivated as of this date roughly delineates the adjudication area for the systematic and sporadic land registration.

Yet no clear authoritative spatial reference is used by the cadastral administration to mark this 2001 turning point. To approximate the location and size of this area, it is useful to examine Cambodian land cover in 2001 (Figure 1 **Error! Reference source not found.**). By overlaying it with the location of irrigation system headwork, it appears that the command areas of most irrigation systems across the country are located in areas that were under cultivation in 2001, thus are eligible for titling. It is also worth noting that some of the land identified as agricultural land is not necessarily being cultivated yet, as for instance some parts of the Tonle Sap flood plain or in Kandal province.

The low prevalence of land conflicts in these areas is due to the fact that these were regions where the decentralized and locally-driven distribution of land to the households by the *Krom Samaki* had allowed the peaceful creation of secured land tenure arrangements. Furthermore, the granting of Economic Land Concessions does not occur in these areas, which are mostly cultivated by smallholders. We have argued elsewhere that the process of land titling in these areas has not necessarily changed the security of land tenure, as the land title has basically reinforced possession land rights that were already secured (Stanford, et al., 1994).

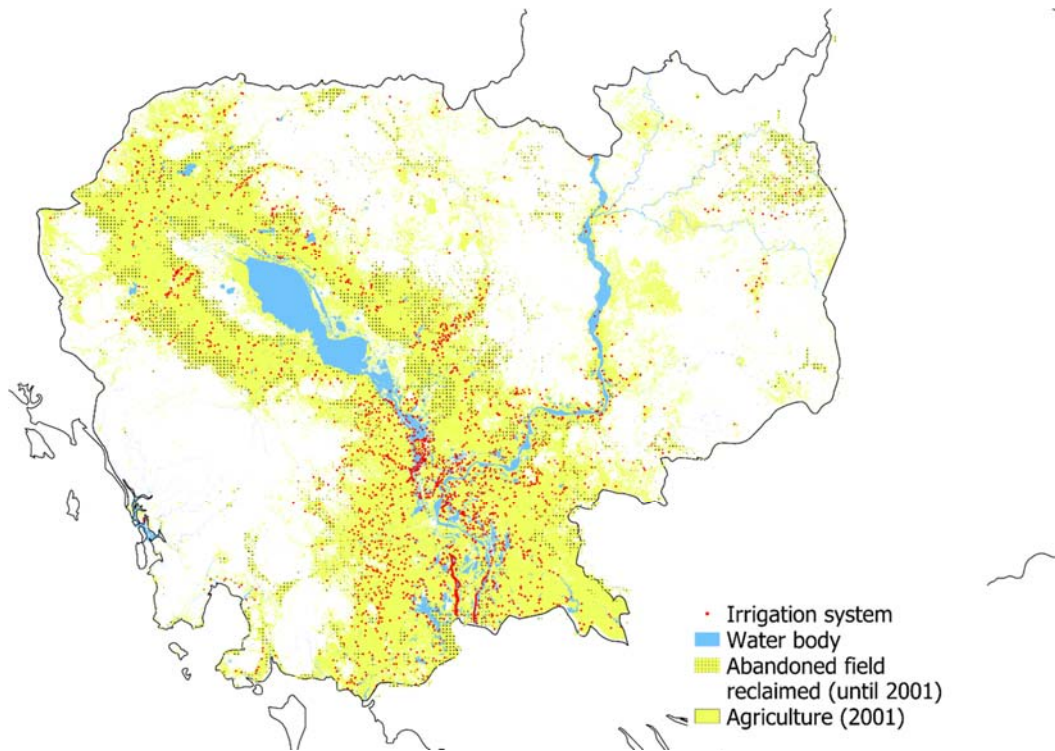


Figure 1. Agricultural areas as of 2001 (the year of Land Law promulgation)

Data sources: Hook et al. 2003; Aruna Technology 2014; ODC 2014; CISIS 2017. Mapping: authors

The main land tenure issues here relate to the process of demographic pressure on land, compelling an increasing number of households to live on very small agricultural landholdings (and to have little or no livelihood options other than to leave). The decline of the agricultural labor force, combined with a wealth-biased land market and the increasing intervention of external actors wanting to invest in land (for agriculture production or for mere speculative purposes), resulted in land concentration. The process can be exacerbated by over-indebtedness when farmers are in default of payments with a micro-credit institution because their land can be confiscated and put up for sale when it is used as collateral.

1.2 The dynamics of agrarian expansion

Processes of agrarian expansion that are relevant to our subject matter have been at play since the promulgation of the Land Law in 2001 (Figure 2).

1.2.1 Going into flood plains

At the edge of the central rice plain (Tonle Sap and Mekong-Bassac South regions), is a large agricultural area that used to be cultivated but was abandoned during the long period of socio-political instability that ended in the eighties. It was recolonized from the nineties to the early 2000s. This land reclamation went beyond the limit of land previously cultivated into shrub, grassland and secondary forest. The expansion of the cultivated area into floodplain took place at the expense of flooded vegetation (grassland, shrub land, and forest). It is driven by local farming communities aiming to expand their agricultural landholding, but also increasingly by external investors who are akin to relatively small-scale and opportunistic land pioneers..

1.2.2 Expanding from the rice plain outward

A similar process of agrarian expansion took place on the other edge of the central plain, towards non-flooded areas. Land transfer in the period that followed the distribution by *Krom Samaki* -

particularly in the 1990s - was not well regulated and some households could access land in the forest periphery of the village kept as reserved land by local authorities. Access to this peripheral land - usually located in the surrounding degraded forest - was possible through either reclamation of land possessed by the household before the war, or was contingent on good connections with the commune and/or district authorities. Power and social relations played a key role. Furthermore, starting in 2001 - when the Land Law which forbade forest land clearance was passed - land was negotiated financially in certain cases with local authorities. Nowadays, the intense land speculation by companies or individuals on State land has made access to additional land by clearing more difficult. The tenure on these areas is relatively unclear for the reasons explained above.

What is typically at stake here is the interface between agrarian expansion, irrigation, and land tenure. The key question being: if the irrigation system is built in these areas or incentivizes the expansion of agricultural landholdings into areas classified as State land that are not eligible for land titling, how can farmers obtain some forms of security on their land claims?

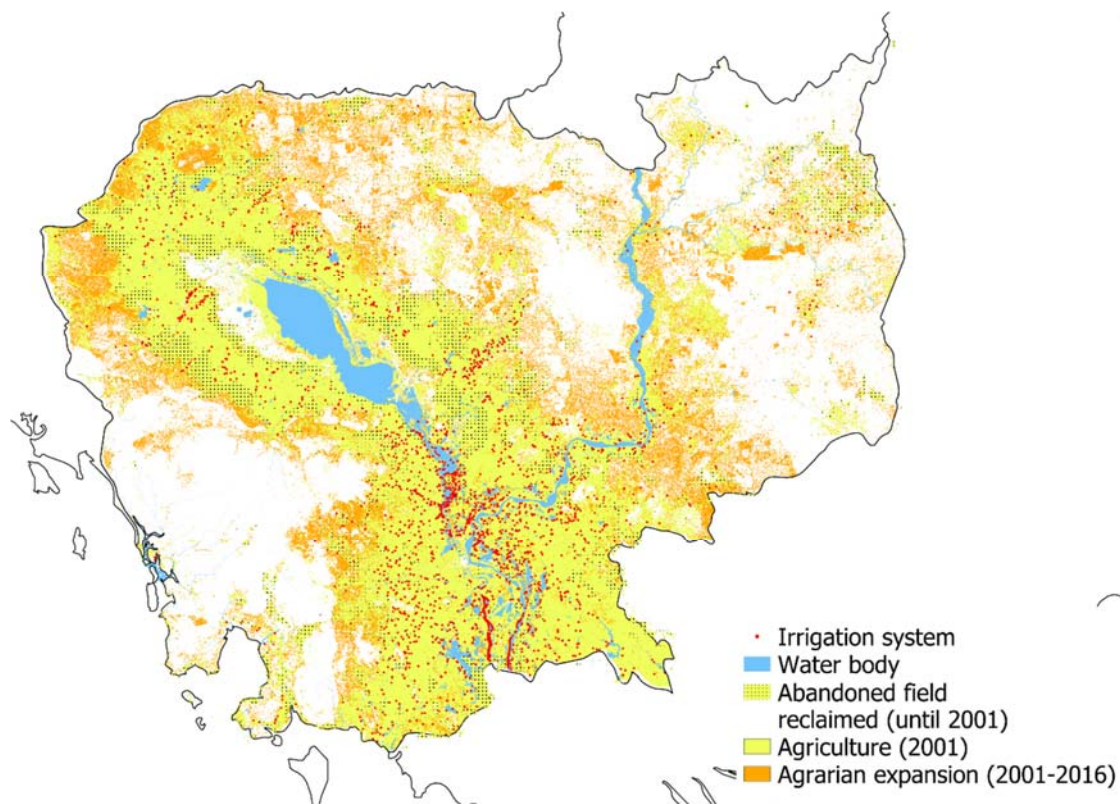


Figure 2. Agrarian expansion in Cambodia (2001-2016)
 Data sources: SERVIR; Aruna technology 2014; ODC 2014; CISIS 2017. Mapping: authors

1.3 Irrigation and fisheries management³

Another issue affecting farmers and the promoters of irrigation is the intricate relationship between those maneuvering in an irrigated system and the proponents of capture fisheries.

³ The section on fisheries is partly derived from Diepart et al., (2019) 'A qui sont ces communs? La cogestion dans les pêcheries de la plaine d'inondation du Tonle Sap, une perspective d'écologie politique', in Aubert, S. et al. (eds) *L'approche par les communs de la terre et des ressources qu'elle porte. Illustration par six études de cas*. Paris: Regards sur le foncier no 6, Comité technique « Foncier & développement », AFD, MEAE, pp. 21-30.

The key set of questions here is how the transition from fishing lots (concessions) to Community Fisheries is being addressed in policies and on the ground and if/how this transition has an impact on the development of irrigation and vice-versa.

The fishing lot system was a formal arrangement that framed large-scale commercial fishing activities in Cambodia from the end of the nineteenth century. It was introduced during the French protectorate and has been managed through the centralized leasing of fishing rights. It was conceived as a concession model wherein the State leases fishing grounds based on management plans submitted by private entrepreneurs and against payment of royalties to the national budget (Sok, 2014). As of early 2000, the total area covered by fishing lots in the country was 9,640 km² (Figure 3). The lease system worked through a succession of sub-lease contracts so that the area delineated as one lot was actually operated by a range of sub-lessees – under high military control – and often stretched far beyond the lot boundaries. Fishing lot operations were limited to a so-called open season (from December to April) while the closed season was open to family-scale fishing operations for the rest of the year (Degen et al. 2000).

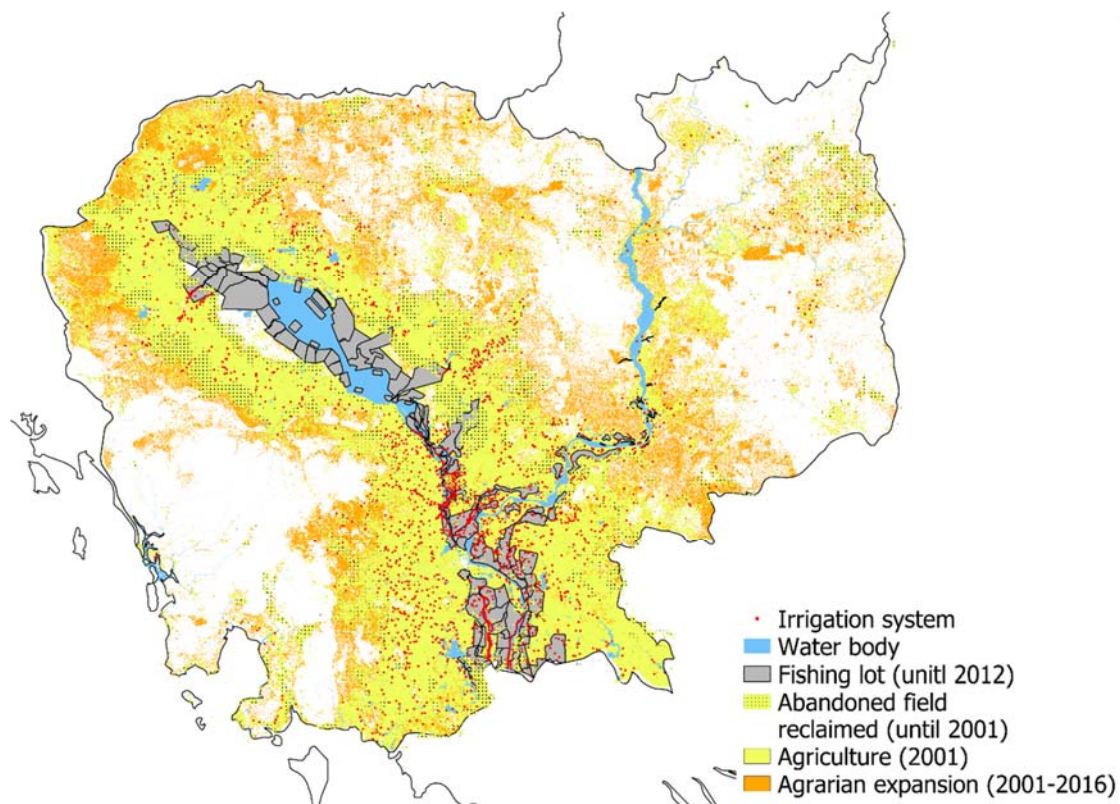


Figure 3. Location of fishing lots in Cambodia (until 2012)

Data sources: SERVIR; Aruna Technology 2014; ODC 2014; CISIS 2017; FiA. Mapping: authors

In late 2000-2001, however, Prime Minister Hun Sen declared that Cambodian fisheries management was in a State of ‘anarchy’ and initiated ambitious reforms to restructure the whole sector. Fishing lots were canceled in a two-stage process (in 2001 and in 2012); and in areas released from fishing lots, the new fisheries administration established Community Fisheries. Community Fisheries are a co-management arrangement wherein responsibilities and rights over fisheries management are co-produced by a community of users and the provincial Fisheries Administration. The creation of Community Fisheries (CFis) received keen support from many donors and development agencies. Within a short space of time, a significant number of CFis were established through a process including registration of users as members of a community, the election of a local management committee, the development of internal regulations and a

management plan, and the signing of an area agreement that formalized the transfer of management rights from the Fisheries Administration to the local community. By 2013, 235 CFIs had been created around the Tonle Sap lake, covering a total area of 5,378 km² (Figure 4).

Yet the movement was not the result of the mobilization of small-scale fishing folk: it was driven by the State itself and its foreign development advisers and partners (Jones & Sok, 2015). Furthermore, the decision to cancel fishing lots opened up an institutional vacuum because it was not accompanied by a clear direction as to how these fishing grounds and commercial fisheries should be managed: CFIs are limited to subsistence fisheries activities and not allowed to engage in commercial fishing (Sok & Yu, 2021). Yet this has been revised in the new Fishery Law (yet to be approved) where limited commercial activities are now permitted.

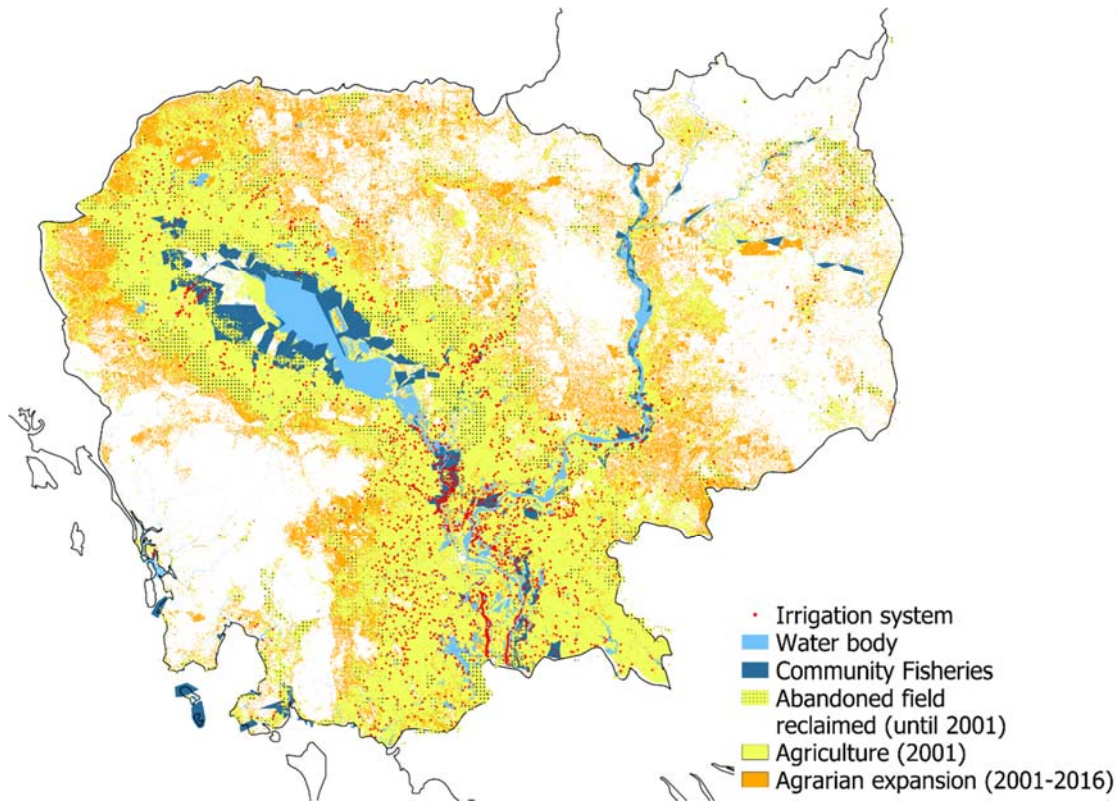


Figure 4. Location of Community Fisheries in Cambodia
Data sources: SERVIR; Aruna Technology 2014; ODC 2014; CISIS 2017; FiA. Mapping: authors

In fact, the opening of the fishing frontier created a space for opportunism, attracting commercial mid-scale fishing folk (mostly previous fishing lot owners and operators) who have continued to enjoy tacit protection from powerful people. They are not new actors but they took advantage of the institutional vacuum to pursue their activities and enclose the fishing grounds, using mostly illegal fishing equipment.

In the absence of clear regulation and control over land management, the cancellation of the fishing lots has also resulted in opportunistic land clearance and the extension of agricultural landholdings dependent on irrigation. The issues here typically revolve around conflicts and contradictions between natural resource governance and land tenure management, both of which are physically and conceptually linked by water management.

The first type of conflict occurring between irrigation and fisheries actors has to do with water management during the dry season when there is a competition over access to water between fisher folk (dry season is the main fishing season) and irrigation for recession rice or dry season rice. It typically occurs when irrigation is based on infrastructure that retains water.

A second issue occurs through the opportunistic and unregulated behavior of actors in the fisheries and irrigation sectors. The cancellation of the fishing lots, particularly in places where they have not been replaced by Community Fisheries, has given rise to unregulated capture fisheries activities that may have an impact on the availability of water for irrigation (in space and time).

1.4 Nature conservation

The development of irrigation across Cambodia sometimes intersects with nature conservation efforts. The Royal Government of Cambodia has paid attention to strengthening the management of Protected Areas that are mainly located in the upland areas peripheral to the main rice plain but also the Protected Area around the Tonle Sap Great Lake.

1.4.1 Protected Area management⁴

In an effort to promote nature conservation, a royal decree for Protected Areas was issued in 1993 to empower the Ministry of Environment (MoE) to lead, manage and develop a Protected Area system to preserve Cambodia's land, forest, wildlife, wetlands and coastal zones (Royal Government of Cambodia, 1993). Twenty-four areas were included in the decree covering a total area of 3.2 million ha, including three RAMSAR sites (i.e., wetlands of international importance) signifying the global importance of Cambodian wetlands (Save Cambodia's Wildlife, 2006). This decree distinguished four different types of protected natural areas: national parks; wildlife reserves; protected scenic view areas; and multi-purpose areas. To these, we should add the protected forests managed under the mandate of the Forestry Administration of the Ministry of Agriculture, Forestry and Fisheries that cover a total area of 1,531,357 ha.

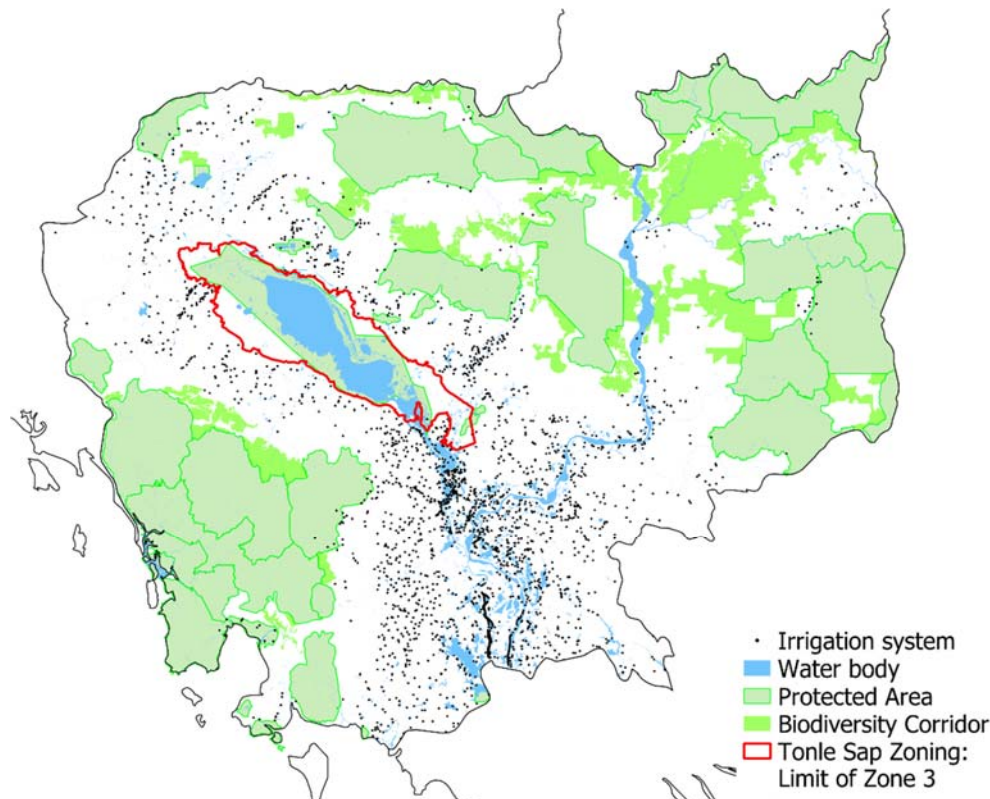


Figure 5. Protected Areas and limits of the flooded forest zone

⁴ Section derived from (Diepart and Sem 2018)

As a result of sub-decree 69, however, the management of nine protected forest areas was transferred to the MoE in 2016. The sub-decree has also officially created eight new Protected Areas but two of these have recently been cancelled (Royal Government of Cambodia, 2016b). In 2017, three new biodiversity conservation corridors, covering a total of 1.5 M, ha were added to the system of Protected Areas (Royal Government of Cambodia, 2017b). So, altogether, the total area under Protected Area management now equals 7.5 million ha (41 percent of Cambodia's total national territory) (Figure 5).

In 2008, a Law on Protected Areas (Royal Government of Cambodia, 2008) clarified information on the management of Cambodia's Protected Areas (PAs). Among other things it proposed that each PA be structured into four spatial zones:

- Core zone area(s) containing biodiversity, natural resources, ecosystems and genetic resources of high value for scientific research and for sustaining the environment;
- Conservation zone area(s) is/are adjacent to the core zone to which access is allowed for local communities and people living within and next to the PA to use resources in accordance with the *prakas* issued by the MoE;
- The sustainable use zone is a zone of great economic value for national development and the development of the Protected Area itself. It also promotes an improvement in the livelihoods of local communities and ethnic minorities. The law on Protected Areas foresees the possibility of giving part of the land in the sustainable use zone to communities. An agreement would then be signed between the Ministry of Environment and local communities to give them the rights to manage and exploit the so-called Community Protected Area (CPA) for a period of 15 years.
- A community zone entails area(s) to be used in the socio-economic development of local communities. It might contain residential land, rice fields and field gardens (*chamkar*), and should protect the rights of ethnic minorities. The release of land titles is possible for these areas but there should be authorization from the Ministry of Environment in consistency with the Land Law. If irrigation exists inside the PA, command areas are considered to be part of the community zone.

1.4.2 Tonle Sap zonation and the protection of flooded forest

In the Tonle Sap floodplain, the legal status of land cleared has remained vague until recently as the cadastral administration did not know where to set the limit of the adjudication area.

In an attempt to protect the Tonle Sap wetlands - considered to be a global hotspot of biodiversity and also crucial for fish spawning - in 2011, the Tonle Sap authorities initiated, by sub-decree, a zonation exercise of the Tonle Sap area (Royal Government of Cambodia, 2011c). The sub-decree 197 differentiates between three zones:

- Zone 1. (417,451 ha) is limited by the national road around the Tonle Sap Lake. It is mainly a residential and agricultural area with paddy fields that are eligible for land titling.
- Zone 2 (365,300 ha) extends further into the floodplain. It is a multiple-use area mainly used for agriculture and fisheries activities. Most of the Community Fisheries established around the Tonle Sap (see above) are located in Zone 2. As far as land tenure is concerned, agricultural land is not eligible for titling but farmers enjoy usufruct rights (*asray phal*).
- Zone 3 (642,793 ha) is dedicated to the strict protection of flooded forests (Figure 5) and agriculture is not allowed inside this zone.

The zonation (in particular the limit of Zone 3) is not clearly delineated on the ground with boundary posts, nor has it really been enforced. So farmers are not familiar with the sub-decree and the physical limits of the zonation. Even more, the steady agricultural pioneering into the

Tonle Sap plain has been taking place for decades and is completely in contradiction to these regulations.

At the end of 2021 (28 November), ten years after the release of sub-decree 197, the Prime Minister Hun Sen ordered several ministries (including the Ministry of Land Management, Urban Planning and Construction (MLMUPC) and MAFF) to investigate land encroachment into Zone 3. He even tasked the Anti-Corruption Unit (ACU) to probe the involvement of government officials implicated in these crimes, publicly naming a high profile civil servant whom he alleged was 'probably guilty'. Just a few days after, following a quick but intensive survey, the Minister of MAFF declared that 30,000 ha across six provinces around the Great Lake had been cleared. The government pledged that all of them would be reclaimed and rehabilitated (i.e., replanted with forest). No systematic updates were available by the time of writing this report (June 2022) but occasional fieldwork and discussions have indicated that farmers and officials were forced to abandon all their land located inside Zone 3 without any compensation and were told that reclamation was not possible (see the Ou Sanda case study below).

2 Characterization of irrigation systems and associated land tenure issues in Cambodia

2.1 Methodological approach

To generalize highly diverse irrigation situations, we identify clusters of irrigation based on agro-ecological variables (river basin boundaries, and the incidence and magnitude of floods) and the magnitude of the irrigation systems (size of the command areas and seasonality of agricultural production). We then examine the diversity of irrigation systems in each cluster based on water control strategies. Against this backdrop we present some key tenure issues that illustrate each irrigation “type”. This discussion is structured around three institutional dimensions: the issues at stake and the possible conflicts; the actors who are involved in these issues; and the institutional context (formal and informal) that frames their behaviors and decision-making (Figure 6).

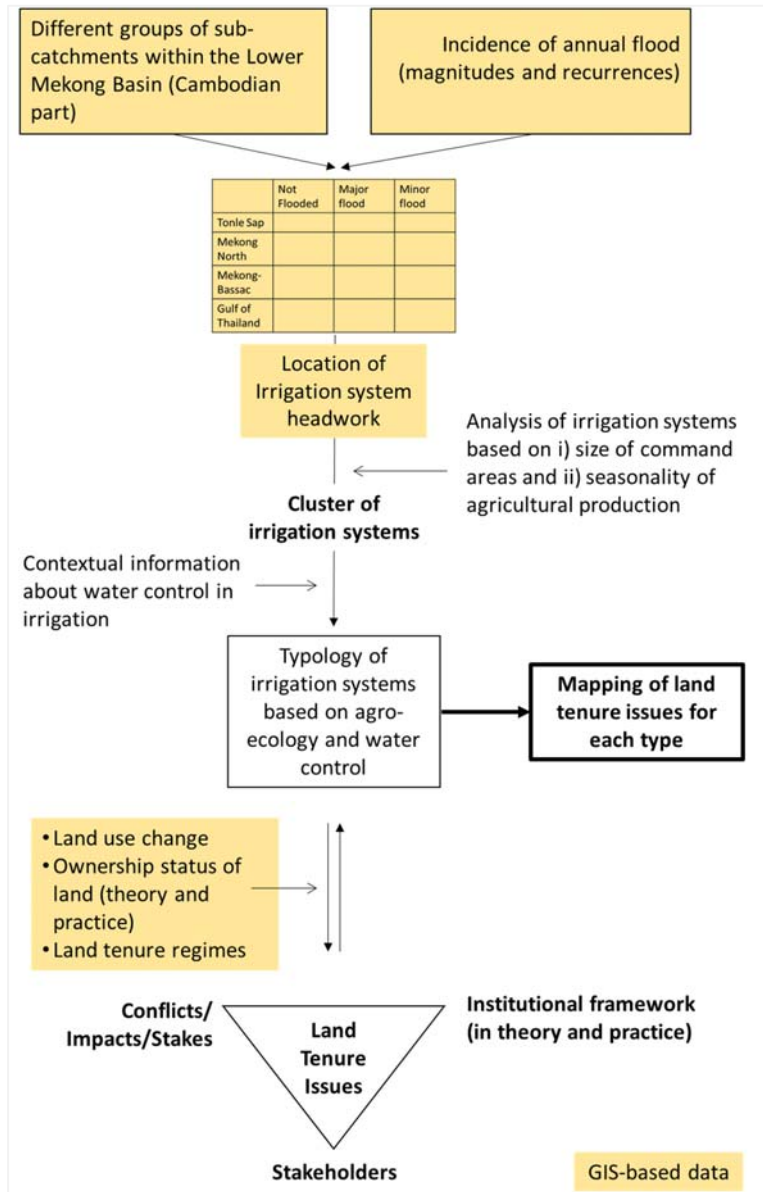


Figure 6. Approach for characterizing the diversity of irrigation systems in Cambodia

2.2 Mapping and identification of clusters of irrigation systems

Cambodia is nearly entirely located within the Lower Mekong Basin. Four main hydrographic regions are identified as groups of sub-catchment areas (Figure 7).

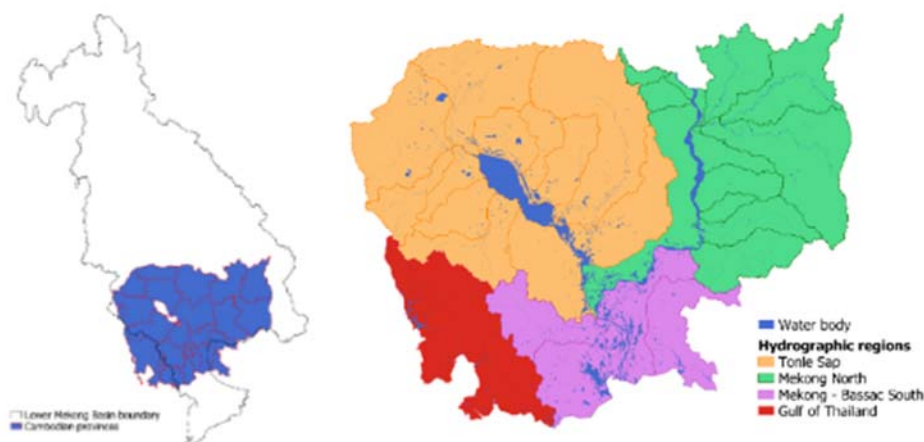


Figure 7. Main hydrographic basins in Cambodia

Data sources: (Hook, Novak, & Johnston, 2003); MRC Interactive Atlas, Aruna Technology 2014; ODC 2014. Mapping: authors

Areas are then characterized according to the frequency and magnitude of floods (Figure 8):

- ⇒ Minor flood area with an annual or bi-annual occurrence
- ⇒ Major flood area with occasional occurrence (every 10 to 15 years)

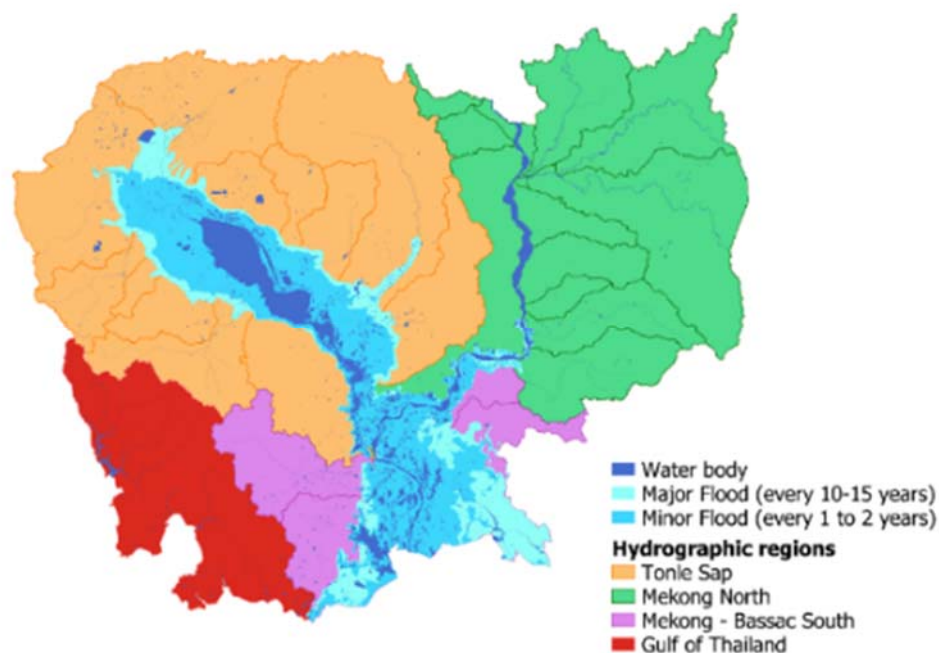


Figure 8. Incidence and magnitude of flood in Cambodia

Data sources: Hook et al. 2003; Aruna Technology 2014; ODC 2014. Mapping: authors

The frequency distribution of irrigation systems based on the hydrographic region and flood frequency is summarized below and in the following table (Figure 9 and

Table 1).

- ⇒ Relatively equal partition between the non-flooded environment (46% of total) and annually flooded environment (43%)
- ⇒ Relatively equal partition between the Tonle Sap system (40%) and the Mekong-Bassac south hydrological regions (42%)

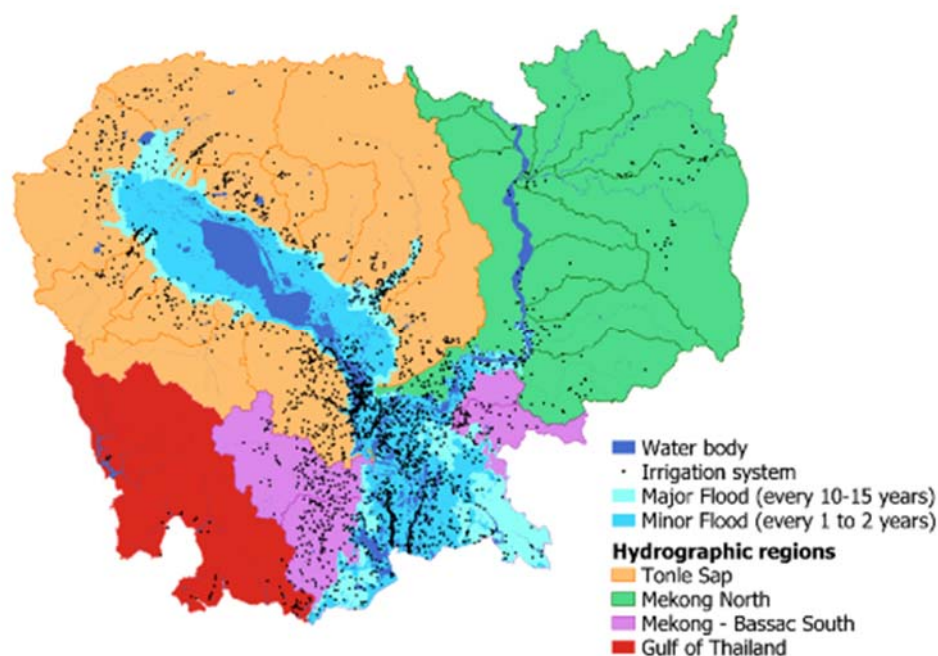


Figure 9. Location of irrigation systems (head work)

Data sources: Hook et al., 2003; Aruna Technology 2014; ODC 2014; CISIS 2017. Mapping: authors

Table 1. Number of irrigation systems by hydrographic region and flood incidence

		Flood Incidence			Grand Total
		Not flooded	Major flood only (exceptional)	Minor flood (recurrent-annual)	
Tonle Sap	#	661	174	185	1020
	%	26%	7%	7%	40%
Mekong - North	#	160	19	234	413
	%	6%	1%	9%	16%
Mekong-Bassac - South	#	289	98	676	1063
	%	11%	4%	27%	42%
Gulf of Thailand	#	49		1	50
	%	2%	0%	0%	2%
Grand Total	#	1159	291	1096	2546
	%	46%	11%	43%	100%

Data sources: Hook et al. 2003; Aruna Technology 2014; ODC 2014; CISIS 2017. GIS-based computation: authors

To identify clusters of irrigation systems, we include information on the command areas in the analysis, more specifically information on the total irrigated area, the irrigated area in the Dry

Season, and irrigated area in the Rainy Season. We refer here to an area potentially irrigated as opposed to the area under actual irrigation (Table 2).

Table 2. Main clusters of irrigation systems in Cambodia

		Not flooded	Major Flood (exceptional)	Minor flood (recurrent)	Grand Total
Tonle Sap	# systems	661 26.0%	174 6.8%	4 7.3%	1,020 40.1%
	Irrig. area in DS (ha)	70,897 15.1%	21,740 6%	54,367 11.6%	147,004 31.4%
	Irrig. area in RS (ha)	574,126 52.5%	102,826 9.4%	20,626 1.9%	697,578 63.8%
	Irrig. area (total) (ha)	595,509 42.4%	111,546 7.9%	70,526 5.0%	777,581 55.4%
Mekong - North	# systems	5 6%	19 0.7%	234 9.2%	413 16.2%
	Irrig. area in DS (ha)	12,519 2.7%	4,329 0.9%	46,806 10.0%	63,654 13.6%
	Irrig. area in RS (ha)	39,597 3.6%	2,079 0.2%	2,932 0.3%	44,608 4.1%
	Irrig. area (total) (ha)	45,091 3.2%	4,329 0.3%	47,465 3.4%	96,885 6.9%
Mekong-Bassac South	# systems	3 11.4%	98 3.8%	676 26.6%	1,063 41.8%
	Irrig. area in DS (ha)	16,726 3.6%	32,339 6.9%	203,237 43.4%	252,302 53.9%
	Irrig. area in RS (ha)	113,280 10.4%	71,957 6.6%	132,904 12.2%	318,141 29.1%
	Irrig. area (total) (ha)	115,227 8.2%	85,418 6.1%	296,887 21.1%	497,531 35.4%
Gulf of Thailand	# systems	6 2.3%	0 0.0%	1 0.0%	50 2.0%
	Irrig. area in DS (ha)	5,155 1.1%	0 0.0%	146 0.0%	5,301 1.1%
	Irrig. area in RS (ha)	32,639 3.0%	0 0.0%	0 0.0%	32,639 3.0%
	Irrig. area (total) (ha)	32,639 2.3%	0 0.0%	146 0.0%	32,785 2.3%
Grand Total	# systems	1,159 45.5%	291 11.4%	1,096 43.0%	2,546 100.0%
	Irrig. area in DS (ha)	105,297 22.5%	58,408 12.5%	304,556 65.0%	468,261 100.0%
	Irrig. area in RS (ha)	759,642 69.5%	176,862 16.2%	156,462 14.3%	1,092,966 100.0%
	Irrig. area (total) (ha)	788,466 56.1%	201,293 14.3%	415,024 29.5%	1,404,782 100.0%

Data sources: Hook et al., 2003; Aruna Technology 2014; ODC 2014; CISIS 2017. GIS-based computation: authors

Note: 1/ DS: Dry Season - RS: Rainy Season - Irrigated area (total): total agricultural area potentially irrigated. Percentages indicate share of total in category. 2/ Letter assigned to clusters correspond to description given below and those on the maps. Red frames refer to the largest clusters only.

⇒ The total potentially irrigated agricultural area is 1,404,782 ha, of which 55% is in the Tonle Sap hydrographic basin, and 35% in Mekong-Bassac South.

⇒ The potential irrigated rainy season area (1,092,966 ha) is 2.3 times more important than the area irrigated in the dry season (468,261 ha).

Main clusters - from the largest to the smallest irrigated area - are as follows (Table 2):

1. The most important cluster of irrigation systems (n=661, 26.0% of the total number of systems or **595,509 ha** irrigated = 42.4% of the total irrigated area) is in the non-flooded part of the Tonle Sap hydrographic region, and mainly supports rainy season agricultural production. If areas occasionally flooded are accounted for, an additional area of 102,826 ha (9.4% of the total irrigated area in the rainy season) can be added.
2. The second-largest cluster of irrigation systems is in the annually flooded area of the Mekong North and Mekong-Bassac South hydrographic regions. It consists of irrigation systems (n=910, 35.8% of total number of systems - **344,352 ha**, or 24.5% of the total irrigated area) mainly dedicated to dry season agricultural production.
3. The third-largest cluster (n=289, 11.4% of the total number of systems - **115,227 ha**, or 8.2% of the total irrigated area) is in the Mekong-Bassac South region as well, but in the non-flooded old alluvial terraces for rainy season agriculture.
4. The fourth-largest (n=185, or 7.3% of the total number of irrigated areas - **70,526 ha** (or 5.0%) of the total irrigated area) is located in the seasonally flooded areas of the Tonle Sap hydrographic region and supports dry season agricultural production (totaling 54,767 ha or 11.6 % of the total irrigated area in the dry season).
5. The fifth-largest group consists of irrigation systems located in the non-flooded Mekong North region, in the North-east region (n=160, or 6.3% of total number of irrigation systems - **45,091 ha**, or 3.2% of total irrigated area), mainly for rainy season production (39,597 ha).
6. The sixth cluster relates to the systems in the Gulf of Thailand region (n=49 or 1.9 % of the total number of irrigated areas - **32,639 ha** or 2.3% of the total irrigated area). These are irrigation systems that control the water for rainy season production.

2.3 Typology of irrigation systems

In each of these geographic clusters there is a variety of irrigation systems depending on size, control of water, management, etc. To simplify, we propose a general description of one or two irrigation system archetypes for each cluster. Each type is identified with a letter and a number. To link with the cluster analysis above, we differentiate irrigation systems between flooded and non-flooded environments (Figure 10)

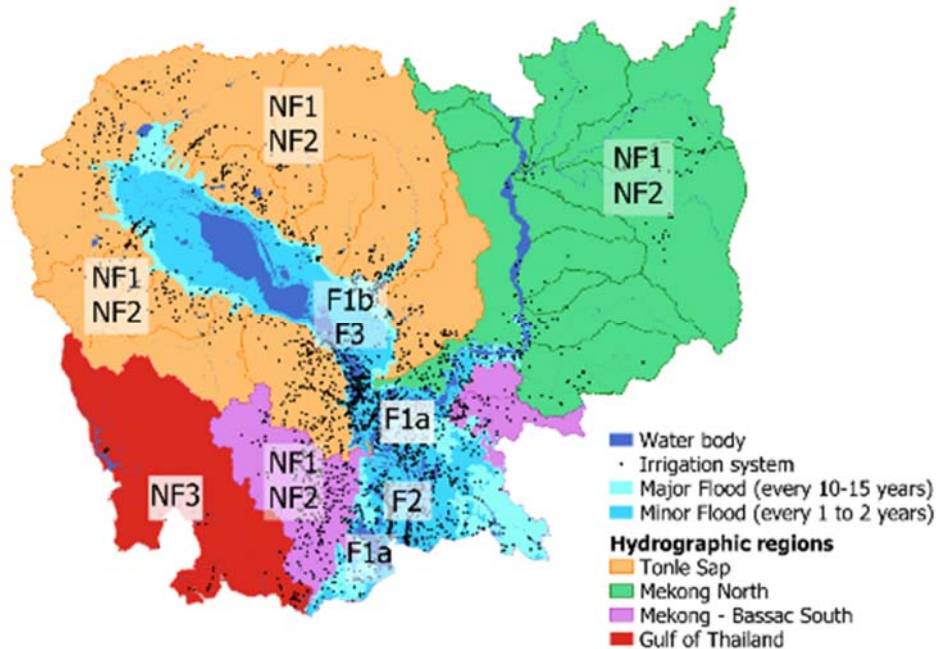


Figure 10. Location of main irrigation types in Cambodia
Note: NF=Not Flooded – F=Flooded
Mapping; authors

2.3.1 In non-flooded environments

NF1 - Systems of water diversion from rivers or reservoirs with a nested hierarchy of concrete canals allowing for gravity-fed irrigation (and occasional pumping). This is used for two consecutive cropping seasons: the early rainy season rice (stretching from February to June depending on the availability of water) and the main rainy season for agricultural production (July-November). To a lesser extent, this system allows for recession rice in the dry season in lowland areas. The infrastructure is heavy and the control over water management is important. This form of irrigation is typically built to divert the water of the Tonle Sap main tributary rivers such as Steung Pursat (pictured below), Steung Chinit, Steung Siem Reap, Steung Mongkol Borey, Steung Sankae, etc. The largest irrigation systems in the country belong to this type.



Mapping of land tenure issues

Type of IS	Issues at stakes, conflicts	Stakeholders	Institutions
NF1	<ul style="list-style-type: none"> - Construction of irrigation infrastructure leading to expropriation and the need for appropriate compensation. Valuation of local contribution (in land) by farmers - Land-market-driven land concentration, in conjunction with indebtedness, mechanization, social differentiation and land speculation - Agrarian expansion into State land and security of land tenure - Urban expansion 	<ul style="list-style-type: none"> - Smallholder farmers contextualized in a network of actors - Donors involved in the design and funding of irrigation systems - Cadastral administration (MLMUPC) - Micro-Finance Institutions - Ministry of Water Resources and Meteorology (MoWRaM) at central and sub-national levels + Farmer Water User Communities - Commune council - Urbanization promoters - External investors on land and agriculture 	<ul style="list-style-type: none"> - Power/patronage networks - Water/land laws and policies - Land titling guidelines - State land management - Protected Area management - Law and guidelines on expropriation - Safeguard policy and due diligence guidelines of donors - Irrigation project/design document - Sub-national and communal development plans - Local land use planning documents - Urbanization policy

NF2 - Pumping systems (as opposed to river/reservoir diversion systems) are mainly for rainy season agriculture in non-flooded conditions (early rainy season and rain fed-rice. The pumping takes place through a central pumping station that provides water for an entire system⁵. This is the system developed by CAVAC (Cambodia-Australia Agricultural Value Chain Program). The infrastructure is lighter compared with the previous type; narrow concrete-lined canals are preferred to a large nested hierarchy of canals. The command area is smaller. These irrigation systems are also developed by CAVAC in a flooded environment for dry season production and in other hydrographic systems but are mainly concentrated in the Mekong-Bassac South system.



⁵ Wherever there is a supplemental water source close to a cultivated field, pumping can also take place privately with a small horsepower machine. This type of irrigation can be found everywhere across the country.

NF3 – Polders. The polder system consists of a system of dikes and drainage canals that prevent saline intrusion along the coast, and that drain excess water to the sea.



Mapping of land tenure issues

Type of IS	Issues at stakes, conflicts	Stakeholders	Institutions
NF2 – NF3	<ul style="list-style-type: none"> - Land-market-driven land concentration in conjunction with indebtedness, mechanization, social differentiation and land speculation - Agrarian expansion into State land and security of land tenure on State land - Urban expansion 	<ul style="list-style-type: none"> - Smallholder farmers contextualized in a network of actors - External investors in land and agriculture - Donors involved in the design and funding of irrigation systems - Cadastral administration (MLMUPC) - Micro-Finance Institutions - MoWRaM at central and sub-national levels + Farmer Water User Communities - Commune council - Urbanization promoters 	<ul style="list-style-type: none"> - Power/patronage networks - Water/land laws and policies - Land titling guidelines - State land management - Protected Area management - Irrigation project/design documents - Law and guidelines on expropriation - Safeguarding policy and due diligence guidelines of donors - Sub-national and communal development plans - Local land use planning documents - Urbanization policy

2.3.2 In flooded environments

F1 – Built-up systems for recession agriculture. Systems based on the control of floodwater and/or flood protection systems. Water is used during the flood recession with drainage canals and/or water level control dikes allowing for irrigation with individual decentralized pumping mainly for early season rice (F1a). The infrastructure (primary and secondary canals) is substantial and the control over water management is conducted by entrepreneurs or groups of farmers. Around the Tonle Sap, the built-up infrastructure consists sometimes of a flood reservoir

that retains water during the flood for gravity-fed irrigation on large command areas during the flood recession (F1b).



Takeo (drainage canals - landscape view)

F2 - Prek. Prek, found in Kandal province along the Mekong and the Bassac Rivers, are simpler structures (just one primary earthen canal, and no nested network of canals). They irrigate cropping systems oriented towards intensive gardening and vegetable production and are not primarily rice-based. Prek are connected through a low-lying wetland (បឹង - *boeung*) that receives all outflow water and in which recession rice is usually cultivated.



Mapping of land tenure issues

Type of IS	Issues at stakes, conflicts	Stakeholders	Institutions
F1a, F1b and F2	<ul style="list-style-type: none"> - Construction of irrigation infrastructure leading to expropriation and the need for appropriate compensation - Land-market-driven land concentration, in conjunction with indebtedness, mechanization, social differentiation and land speculation - Cross-border land leases - Conflicts with farmers-fisher folks (small- or middle-scale/subsistence/commercial fishing) - Urban expansion - Seasonal enclosure of land for agricultural production (and negotiations with fishers, herders) - Opportunistic land clearance and land tenure security - Agrarian expansion into State land and security of land tenure 	<ul style="list-style-type: none"> - Smallholder farmers contextualized in a network of actors - Donors involved in the design and funding of irrigation systems - Cadastral administration (MLMUPC) - Micro-Finance Institutions - MoWRaM at central and sub-national levels + Farmer Water User Communities - Commune council - Community Fisheries - Commercial fishing stakeholders including ex-fishing lot owner/sub-lessees - Fisheries Administration - Urbanization promoters - External investors on land and agriculture, including from neighboring countries through land lease arrangements 	<ul style="list-style-type: none"> - Power/patronage networks - Water/land/fisheries laws and policies - Land titling guidelines - State land management - Protected Area management - Flooded Forest around the Tonle Sap - Law and guidelines on expropriation - Safeguarding policy and due diligence guidelines of donors - Community Fisheries management plans - Irrigation project/design document - Sub-national and communal development plans - Local land use planning documents - Urbanization policy

F3 –Systems with limited infrastructure for recession agriculture. A system of partial water control with minimal to no infrastructure, established in the flooded lowland environment for recession of dry season rice production. Water flows gradually with the recession of the flood. This system is typically found in the flooded environment around the Tonle Sap but also in the southern part of the Tonle Sap floodplain up to the point of confluence between the Mekong and the Tonle Sap rivers.





Mapping of land tenure issues

Type of IS	Issues at stakes, conflicts	Stakeholders	Institutions
F3	<ul style="list-style-type: none"> - Land-market-driven land concentration, in conjunction with indebtedness, mechanization, social differentiation and land speculation - Conflicts with farmers-fisher folks (small- or middle-scale/subsistence/commercial fishing) - Seasonal enclosure of land for agricultural production (and negotiations with fishers, herders) - Opportunistic land clearance and land tenure security on State land - Agrarian expansion into State land and security of land tenure 	<ul style="list-style-type: none"> - Smallholder farmers contextualized in a network of actors - External investors on land and agriculture - Cadastral administration (MLMUPC) - Micro-Finance Institutions - MoWRaM at central and sub-national levels + Farmer Water User Communities - Fisheries Administration - Community Fisheries - Commercial fishing stakeholders including ex-fishing lot owner/sub-leasees - Tonle Sap Authorities - Ministry of Environment - Commune council 	<ul style="list-style-type: none"> - Power/patronage networks - Water/land/fisheries laws and policies - Project/design document - Land Law and land titling guidelines - Safeguarding policy and due diligence guidelines of donors - State land management - Protected Area management - Flooded forest around the Tonle Sap - Fisheries law and policies - Community Fisheries management plans, sub-national and communal development plans - Local land use planning documents

3 Legal and institutional frameworks governing irrigated land tenure in Cambodia

In this section, we analyze the legal and institutional framework relevant with irrigated land tenure. It is based on a review of key documents that are briefly presented in annex 9.5 (main laws, decrees, and relevant policies concerning irrigated land tenure).

The analysis is organized around five interconnected themes:

- 1) Land tenure security
- 2) Land expropriation
- 3) Environmental impact assessment
- 4) Land market, concentration and consolidation
- 5) Multi-functional management of wetlands

These themes were chosen because they help in examining issues that concern the different development stages of an irrigation project (from the feasibility study to daily operations) with an inter-sectoral perspective (linking land and water with agriculture, the environment and fisheries).

For each theme, we first present the scope of the legislation, its strengths/weaknesses, and the institutional roles and responsibilities of institutions that oversee their implementation (Figure 11). We then highlight some implications and shortcomings in this institutional setup. Based on a series of interviews conducted with donors and relevant ministries, we present how the legal framework and policies are actually implemented including if/how the limitations and shortcomings identified earlier are addressed in context.

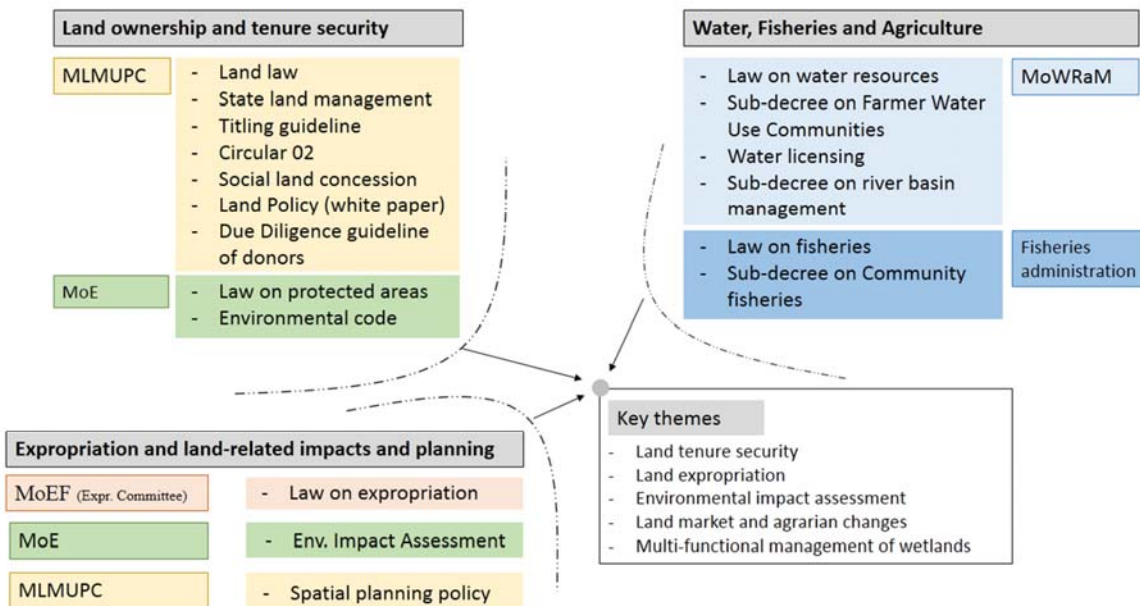


Figure 11. Main bodies of legal documents governing irrigated land tenure in Cambodia

3.1 Land tenure security

3.1.1 Legislation and institutional set-up

As explained above (2.2 Land ownership private versus State land domains), the 2001 Land Law does not allow possession to be based on occupation that starts on, or after, the effective date of

the Law in 2001 (Articles 30 and 31). This means that all land not cultivated as of 2001 is considered *de facto* as State land and as such, is not eligible for titling.

A key step along the titling process is adjudication, whereby existing rights in parcels of land are authoritatively ascertained: adjudication does not alter existing rights on land and it does not create new rights (Lor & Suon, 2001). To determine whether a plot is eligible for titling (i.e., it was possessed before 2001) the titling team used satellite images of 2001 but also consulted with local authorities to identify the context in which lands are held privately (interview). In the context of an irrigation system, there are no specific procedures or concerns on the part of the cadastral administration; the titling process follows the standard titling guidelines everywhere (interview).

3.1.2 Implications and shortcomings of the institutional set-up

A regular problem occurring during the adjudication process concerns the identification of the land legally possessed that is eligible for titling. The cadastral administration at the provincial and district level uses land cover maps to differentiate between lands utilized before and after 2001.

The strict obedience of this provision - set in the Land Law - basically excludes all those who acquired land through clearance after 2001. Given the context of the internal movement of people, this is highly problematic.

However, local authorities are issuing land possession certificates to residents and farmers through two types of documents: the certificate of land transfer (*aekesa pte kamaset*) and a request for land occupation (*pi sna som can kap dey*), or the land history record (*aekesa provat dei*). These documents are also issued for land cleared after 2001. Thus, there is a mismatch that needs to be reconciled during the adjudication process.

3.1.3 In practice: experiences of ministries and donors

The cadastral administration usually adopts a strong stance in following the 2001 rule, i.e., not issuing titles for land cleared after 2001 (interview with MLMUPC representative). This is particularly the case for all land cleared after the rehabilitation or construction of an irrigation project. Other trustee State land authorities (i.e., departments that have claims in the management of State land) usually lobby to keep State land under their jurisdiction, thus putting pressure on the cadastral administration not to issue titles on what is categorized as State land (interview). If the cadastral team is confronted with land tensions and disputes, a process of conflict resolution – potentially very long - needs to precede the titling. In this case, the 2001 rules are the official cut-off date.

In practice the context in which the land titling proceeds has a bearing on its outcomes. In other words, the 2001 rule serves as a framework, but the outcomes of the titling are highly contingent on local deliberations between actors (interview with the MLMUPC representative). Compromises are often made to find a solution, particularly when the titling ineligibility affects poor families and/or land that is being truly exploited (interview).

The AFD takes land tenure seriously with regard to the irrigation systems they support. During the feasibility study, a Land Measurement Survey is deployed to: i) inventory all land rights of farmers in the command area (an adjudication process in its own right), ii) conduct measures to delineate the boundaries of plots, and iii) validate the results of the process undertaken by the farmers. While the approach scrupulously follows the methodology used by the cadastral team, MLMUPC does not provide an interim validation of the process and repeats the work during the systematic land registration.

In the design phase of any irrigation project, the Asian Development Bank (ADB) studies land ownership inside the command area. The land profile produced includes land size and current land use. Based on the project documents available to us, this land survey does not provide much detailed information about the year and mode of land acquisition, which limits the *ex-ante* analysis concerning land tenure arrangements. The main purpose of the exercise is for the ADB

to be able to collect Irrigation Service Fees (10 USD/ha/year), and not to address any potential land issues.

If land cultivated by people is claimed as State land by the government (e.g., reservoirs abandoned since the Khmer Rouge period, and that have become cultivated by people as rice fields), the ADB team lets local authorities gain full clarity on land occupation (and to issue land possession certificates as needed) before stepping in. The MLMUPC does not intervene in the process at this stage.

If the irrigation project incentivizes agrarian expansion beyond the command area, the ADB may consider extending the project. But in this case, a new project design is required and the key consideration revolves around technical feasibility rather than land ownership and land tenure issues (interview).

In the past, the ADB has tried to mobilize the cadastral administration to title the land that is located inside the command perimeters. However, the price for titling services charged by the MLMUPC was very high (sporadic registration rate). As these costs are incurred by the government, the MEF blocked the titling process and the irrigation systems were developed without prior securitization of land. It seems that this has created a jurisprudence. There is usually no contact between the ADB and MLMUPC at all. The MLMUPC provides land titles once the irrigation area is operational and does so along with the usual Systematic Land Registration procedure. The cadastral administration may sometimes extend the adjudication to land put under cultivation after 2001 but this is negotiated on a case-by-case basis.

The ADB reports cases where land inside the command area was not titled by the MLMUPC because the land was considered to be State land. In this case, the size of the plot is reduced (with or without a proper expropriation process) or farmers are allowed to cultivate with usufruct rights (as opposed to possession or ownership).

3.2 Land expropriation

3.2.1 Legislation and institutional set-up

When an irrigation project results in expropriation, the question of defining fair and just compensation is central. The legal framework mobilized for expropriation is bound by international law. Under international human rights law, coerced and involuntary resettlement is seen as a deliberate retrogression in the enjoyment of human rights (*No one shall be arbitrarily deprived of his property*, Article 17 of the 1948 Human Rights Declaration (United Nations, 1948). Cambodia is a party to the UN Human Right Declaration and therefore obligated to protect its citizens against arbitrary deprivation of landed property.

At the national level, the laws and institutional mechanisms mobilized towards expropriation are in line with the Constitution, the Land Law, and the Law on Expropriation. Both the Constitution and the 2001 Land Law guarantee an individual's right to property protection. But it was only in 2010 that a legal mechanism was put in place to govern the process by which the government could fairly and justly expropriate private property for public purposes. In its Article 4, the Law views expropriation as the confiscation of ownership - with fair and just prior compensation - of immovable property (including land, buildings, and cultivated plants) for the construction, the rehabilitation, or the expansion of public physical infrastructure, which is in the national and public interest. Public physical infrastructure definitely includes irrigation systems (Article 5).

The expropriation process is managed by an expropriation committee consisting of representatives from all relevant ministries, led by a representative from the Ministry of Economy and Finance (MEF). The law also foresees the creation of a *Complaint Resolution Committee* led by representatives from the Ministry of Land Management, Urban Planning and Construction, and from other concerned ministries/institutions.

Governed by the Expropriation Committee, the process for expropriation follows several steps: i) a project proposal for government review, ii) a survey detailing the rights of property owners or lessees, iii) meetings with local authorities, iv) a notice to owners in the form of a declaration in

multiple forums, v) the possibility for owners of the expropriated property to file a complaint to contest the validity of the appropriation or to see if it can be moved, and vi) the compensation and/or relocation proposal. To navigate through this process, farmers require appropriate, affordable, and timely support.

The law states that the compensation for the expropriated property must be fair and just. It should be paid in advance based on the market value of a property, excluding changes in value after the irrigation project came into effect.

3.2.2 Implications and shortcomings of the institutional set-up

As the State is the only entity that can expropriate in the public interest, the scope of the law does not extend to evictions by private entities or concessionaires. In this case, the entire expropriation process, including compensation and relocation, is borne by concessionaires or private investors according to relevant State legislation such as that governing EIAs and any specifications in the contract or agreement between the concessionaires/investors and the State (if there are any).

The law does not protect individuals who are not considered the rightful owners. That is, who lack titles to their land or who live on State property and are therefore deemed illegal settlers. But these circumstances are not rare in rural areas, particularly in upland regions that have received important influxes of migrants over the last 20 years. In 2007, the government issued Circular 02 on measures against the illegal holding of State land, which provides various options for resolving land right issues. The Circular explicitly recognizes that compromises are needed, especially to find a solution for the families who are really poor, and when the land is genuinely used. The Circular aims to address each infringement separately (on a case-by-case basis), which limits the possibility of finding a collective solution for a group of people or villages facing similar problems. On top of that, the procedures foreseen by the Circular are sophisticated as they involve several committees and authorities (National Authority for Land Conflict Resolution, Provincial State Land Management Committee, and State Land Trustee Authority). It is very difficult for a farmer to navigate alone through these institutions and networks.

Adding to the point above, problems arise when the expropriation concerns common-pool resources that are not effectively possessed individually (such as cultivated land), but are rather used collectively by a group under customary management or in open access. In this case, appropriate compensation measures require documentation of the different types of access and use of the resources that are expropriated.

Even if the law explicitly states that land lost must be compensated for at market price, there is no clear guidance to determine if the agro-ecological and socio-economic environment in the new location meets the necessary conditions to support livelihood development.

The entire process of expropriation requires coordination between several ministries and institutions at the provincial level.

3.2.3 In practice: experiences of ministries and donors

Asian Development Bank

The ADB has developed its own set of safeguard policies and measures, and, to acquire an ADB loan, the government is requested to follow these guidelines. The government pays for the compensation scheme, so the expropriation mechanism is a hybrid process that follows the guidelines of the ADB and government institutions. It includes the following:

- Due diligence analysis to assess the impact of the project
- Preparation of resettlement plans (usually conducted by a consultant)
- The expropriation committee suggests an area for relocation but the ADB has a say about it

- Development of compensation measures → submit to the General Department of Resettlements for endorsement (MEF) → send to the ADB, and, if there is no objection → implementation

The goal of the ADB's compensation system is to ensure that those who are being affected by the development project should not be worse off, but at least remain the same, or achieve better livelihoods.

When the safeguard policy is too demanding (e.g., in terms of payment for compensation), the government may decide to shift toward funding from "Chinese public money", which comes with less structured guidelines and conditions (interview with an ADB representative).

According to the ADB guidelines and practices, the criteria considered in land valuation are: the size and the type of land use (crops and/or trees). The criteria that are not considered are: the quality of the land, the socio-economic environment (comparing old and new locations), nor a detailed review of the diversity of rights enjoyed by the land users (ownership, possession, usufruct, leases, sharecropping, etc.)

To address the difficult questions relevant to the classification between State land and private land, the delineation of State land and private land within the command area is outsourced to local authorities. The ADB team and other project proponents do not intervene in this process and step in only when an agreement is reached between all local stakeholders. The MLMUPC does not intervene in the process. Yet the distinction is important as it determines the degree to which the households will be compensated in cases of expropriation.

With regard to the compensation system, frequent problems are: i) the value of land for compensation does not meet the expectations of farmers, usually because the rate used is the rate before the project (the ADB sets a cut-off date and values property before this cut-off date), 2) the agro-ecological and socio-economic environment in the new location is not equivalent to that of the previous place (interview), 3) common pool resources are usually undervalued in the assessment of the property to be expropriated (interview) - the question of opportunity costs of the project are, therefore, not sufficiently taken into account - and, 4) the quality of the resettlement plan is not acceptable.

As far as the dispute resolution process during expropriation is concerned, the preferred option is to address complaints and disputes locally. The ADB tries to settle all complaints before any construction starts, which may take several months or years. If conflicts remain unresolved when construction starts, local folk can complain through the ADB-created Grievance Redress Mechanisms. Another avenue is the Complaint Resolution Committee set out in the Law on Expropriation. As a last resort, a complaint is filed in court, but this is not very frequently used.

The Ministry of Land Management, Urban Planning and Construction

The valuation of land and resources to be expropriated follows a process led by the Ministry of Economy and Finance. The MLMUPC participates but does not have a leading role. In practice, if the owner of the land to be expropriated cannot show proof of land possession before 2001, the expropriation will likely occur without proper compensation. There are examples of good practice through which formal recognition of land rights was conducted by the cadastral administration before expropriation, so that residents could be properly compensated (e.g., in Sa Ang district, Kandal province, an irrigation project supported by AFD).

3.3 Environmental impact assessment

3.3.1 Legislation and institutional set-up

As required by the sub-decree on Environmental Impact Assessment (EIA), the owner of any public or private large-scale irrigation system larger than 5,000 ha - including the State - is required to conduct such an assessment. The sub-decree is implemented along with two ministerial declarations (prakas), namely the General Guidelines for Initial and Final Environmental Impact Assessment Reports (Ministry of Environment, 2009) and the guideline on

Public Participation in Environmental Impact Assessment process (Ministry of Environment, 2016).

The supervising ministry for EIAs is the Ministry of Environment (MoE) and in particular the Department of Monitoring and Environmental Impact Assessment. This legislation is framed by the Law on Environmental Protection and Natural Resource Management (Royal Government of Cambodia, 1996), the sub-decree on Water Pollution Control (Royal Government of Cambodia, 1999c), and the sub-decree on Solid Waste Management (Royal Government of Cambodia, 1999b). Additionally, the Law on Protected Areas (Royal Government of Cambodia, 2008) and the sub-decree on the Control of Air Pollution and Noise Disturbance (Royal Government of Cambodia, 2000), released subsequently, provide references for the EIA sub-decree and its implementation. Since the release of the sub-decree in 1999, the legal framework has not changed much. The project of drafting an EIA law seems buried.

The sub-decree is complemented by the National Environment Strategy and Action Plan (NESAP) 2016–2023 (Royal Government of Cambodia, 2017a) adopted by the Royal Government in 2017. NESAP is a commitment to sustainable development that envisions strengthening enabling conditions and leverage for environment and natural resource management and conservation for sustainable socio-economic development in Cambodia.

Under the leadership of the Ministry of Environment, the Royal Government of Cambodia is developing an Environmental and Natural Resource Code that will frame and update the institutions and procedures foreseen in the EIA sub-decree. The draft code integrates all the elements of the current sub-decree but differentiates between the so-called Strategic Impact Assessment (SIA) and the Environmental Impact Assessment (EIA). Both aim to ensure that environmental considerations are integrated into development practices in Cambodia, but the SIA addresses them at the policy planning, programs and legal levels while the EIA addresses environmental concerns at the project level.

The EIA process follows a clear procedure: i) the screening of the project to determine whether an EIA is required, ii) the scoping and terms of reference of the assessment (parameters, stakeholders' involvement, the methods, etc.), iii) the actual assessment, iv) the identification and measurement of mitigation measures, v) reporting, and vi) monitoring.

In Cambodia, only registered Cambodian firms are allowed to conduct environmental assessments. All the costs incurred through the entire EIA process are covered by the owner of the project. Therefore, the project owner has substantial influence and control over the content of EIAs.

3.3.2 Implications and shortcomings of the institutional set-up

Several observers have noted that Cambodia's legal framework and high-level requirements for EIAs contrast with the skills of the administration in charge of reviewing EIA reports and follow-up with recommendations (Xia, 2020).

There are also practical challenges in ensuring that the integrity of the EIA process is respected. Indeed, when those carrying out the EIA are paid by the company that submits the projects, the door for biased results and conflicts of interest is wide open.

Beyond the legislation on EIAs (sub-decree and *prakas*), there are no technical guidelines including specific issues to be scrutinized. Technical scrutiny of any project proceeds on a case-by-case basis, without systematic and consistent guidelines with threshold values and red lines. In conjunction with the point above, this impedes a transparent implementation of EIA processes.

As with any cross-sector mechanisms embedded within one particular ministry, a challenge in the implementation of EIA for irrigation projects is the coordination with other project proponents and ministries responsible for infrastructure, industrial or agricultural development.

3.3.3 In practice: experiences of ministries and donors

According to several observers and development practitioners, the implementation of EIA in Cambodia has very limited outcomes (Xia, 2020). Environmental and social considerations and requirements usually pale in comparison with development imperatives. An EIA rarely suggests major deviations from the intended project and predominantly serves the interests of the project owners who finance the impact assessment. A second limitation is the limited public consultation and participation in the EIA process.

MoE

The EIA entails a lot of requirements on a multitude of issues. It puts a high burden on those involved in the process as they have to be familiar with multiple laws, procedures, and mechanisms. In an attempt to support the process, the MoE has released several sector guidelines, but these documents mainly provide guidance on report structure and format, not on technical matters. As a result, the EIA reports are of low quality.

There are only a few cases of EIAs being conducted for irrigation projects in Cambodia. Concerning land issues, the EIA covers the following areas: i) land tenure security in the command areas, ii) encroachment into State land, and iii) soil fertility protection measures. In general, those who implement the EIA are particularly concerned with the land-related issues that may occur as a result of the project, and not particularly about the *ex-ante* situation. For instance, the EIA report will provide criteria and measures to make sure that the project does not provide incentives to encroach into State land but does not examine the land acquisition processes from the past.

A recurring problem in the EIA process is the delay in securing approval from the MoE. This can extend to a year, well beyond the 30-day time frame foreseen in the sub-decree. So, very often, the project starts without considering the conclusions and recommendations of the EIA report.

ADB-JICA (Japanese International Cooperation Agency)

According to ADB project documents made available to us, it seems that environmental assessments strongly focus on impacts such as air and water pollution, soil erosion, traffic congestion, community health and safety, and climate change (in the construction phase). A point of concern is the loss of terrestrial vegetation and habitat in new areas (not previously farmed or long abandoned with forest/shrub regrowth) that come into the command area. Typically, these areas have unclear land tenure because they are usually classified by default as State land (see above). Yet the EIA process does not examine these land tenure and habitat issues.

Donor Coordination with the MoE

All donor organisations have their own due diligence guidelines with respect to assessing environmental and social impacts. When an EIA is conducted with donors involved with their own due diligence guidelines and environmental/social safeguard policies, there is often unnecessary redundancy in the process. The ADB has requested the MoE to harmonize this process, but the dialogue has not yet started (interview).

When the EIA requires that a complete economic analysis is conducted (i.e., costs and benefits of the irrigation project), the team from the MoE in charge of the EIA has difficulty in getting all relevant information from the project proponents who are reluctant to disclose it.

3.4 Land market and agrarian changes

3.4.1 Legislation and institutional set-up

The 2001 Land Law and 2012 Land Policy institutionalize private land ownership and the development of the land market between willing buyers and sellers to ensure an efficient and fair distribution of land between farmers. In these documents, however, there is no real provision as

to how these land markets could or should be regulated, for instance, by setting a ceiling on land accumulation.

3.4.2 Implications and shortcomings of the institutional set-up

There is no doubt that an irrigation project increases the productive capacity and value of agricultural land located inside the command area. And, given that land markets are largely wealth-biased, a possible effect of a free land market could be the concentration of land into the hands of farmers who are well-off. This process can work through speculative land purchases before or after the rehabilitation or construction of the irrigation systems has been carried out.

3.4.3 In practice: experiences of donors, jurisprudences

ADB and MLMUPC

From the feasibility study and until the irrigation system is up and going, irrigation project proponents do not monitor land transactions. The ADB sets a cut-off date to determine the owner and the size of land inside the command area but does not follow the process of land transfers that unfolds. The project conducts an *ex-post* study on the livelihoods of beneficiaries, but land tenure, and land transactions are not featured in the survey.

Likewise, the cadastral administration does not monitor land transactions before and after titling. Most land transactions do not follow the official procedure organized around the cadastral administration, and people continue to rely largely on the village and commune authorities to legitimize their land acquisitions and transfers.

AFD

AFD does not specifically monitor land transactions either, but encourages the Farmer Water User Communities to endorse this monitoring role by engaging with local authorities.

3.5 Multi-functional management of wetlands

3.5.1 Legislation and institutional set-up

As explained above, there are multiple claims on wetland resources across Cambodia from the local level to the river basin scale. These claims are supported in various legal texts and policies implemented by different ministries. Water for agriculture is managed under the water resources legislation while fisheries resources (including water) are managed under the Fisheries Law.

The law relating to water resources clearly states that these are part of the Public State Domain of Land. Groups of agricultural water users are constituted under a so-called Farmer Water User Community (FWUC), a mechanism that delegates the responsibilities for the management and development of some parts of an irrigation system from the Ministry of Water Resources and Meteorology (MoWRaM) to a local user group. The delegation is limited though as MoWRaM retains a leading role in the management of the FWUC and responsibilities over the larger infrastructures.

With the cancellation of the fishing lots, the key mechanism to manage capture fisheries is now Community Fisheries (see detailed description above). Community Fisheries groups manage an area delineated theoretically as public State land. In recent years, the fisheries reform has opened up the way for the development of aquaculture, which has arguably become the key pillar of the fisheries sector in Cambodia. The influence that aquaculture will have on capture fisheries and irrigation remains unclear. Hypothetically, it will have a differentiated impact on rural folk. Better-off rural families, who can invest in aquaculture, may move away from capture fisheries, while capital-poor families will continue to depend on capture fisheries. But overall, rural communities will become less dependent on capture fisheries, which could ease the development of irrigation and agrarian expansion.

A third institutional layer comes into play if resources are located inside Protected Areas, for instance, the Tonle Sap Multiple Use areas. In this case, the Ministry of Environment and the legislation on Protected Areas are also relevant.

Theoretically, the legal framework regulating water and land management in wetland areas offers a wide set of possibilities towards integrated and inclusive management. The idea of integrated water resource management at watershed level takes center stage in the Law on Water Resources. The water and agriculture policy suggests that water resources, irrigation, and land management ought to be managed in an integrated manner at the river basin scale with a key focus on land use planning, and land allocation and tenure programs.

3.5.2 Implications of and shortcomings in the institutional set-up

Despite apparent clarity in the legal framework, it is important to recognize that current agrarian development in Cambodia results in intensified use of land and water resources in wetlands areas, making the claims and interests of stakeholders increasingly competitive.

While the formal documents all propose eloquent integrated approaches, the institutions and committees tasked to create this integration are still very much nested within sector ministries, thus posing similar issues of coordination as noted above.

The reference to integrated water resources management means that stakeholders should combine at local level with more deliberative and adaptive water governance process wherein local stakeholders can craft local solutions to local problems.

Adding to these difficulties, neither the legislation on water nor on fisheries explicitly addresses the trade-offs inherent in multi-functional management. The spatial planning that could delineate within these trade-offs is embedded within the Ministry of Land Management, Urban Planning, and Construction, which does not necessarily help coordination.

3.5.3 In practice: experiences of ministries and donors

In the last decade, both the demographic increase and the commodification of agriculture have pushed the demand for agricultural and settlement land and have opened up the enclosure of wetland resources across the country. The process is driven by smallholder farmers as well as by larger agricultural entrepreneurs and is very often accompanied by the construction of small- to large-scale irrigation infrastructure, which often implies transfer or pumping water from CFI natural dry season refuges.

At the same time, Community Fisheries have performed quite poorly and have not been able to offer a credible alternative to the privatization of common property resources. This is due to at least three reasons:

- The Community Fisheries areas usually include a mix of State land (flooded) and private land (agriculture and settlement). As Community Fisheries regulations have a bearing only on fisheries activities (fishing gear, protection of flooded forest, etc.) and not on agriculture, it is very difficult for the CFI committee to control agrarian expansion within a Community Fishery area. A related problem is that CFI areas are approved only at the level of the Ministry of Agriculture, Forestry, and Fisheries (MAFF) but they are not properly registered as State land in the State land cadaster.
- Community Fisheries are under-financed and under-supported. The right to operate community-based fisheries activities for income generation at the community level is not granted by current Cambodian law although exceptions can be granted locally. The new Law on Fisheries will correct this limitation. In the context of decreasing support from non-State actors, any CFI system has only a limited capacity to generate revenue to help finance its regular activities, such as patrolling, organizing, meetings and consultations. The absence of a collective commercial right to sell is a key obstacle to sustain CFI activities in the long run.

- At the policy level, the key focus of the Fisheries Administration to boost the sector is now on aquaculture as a way for individual and Community Fisheries alike to generate revenue. Capture fisheries will likely receive less institutional support as a result.

In practice, despite their interconnectedness, the irrigation, agricultural water, and fisheries sectors are evolving in divergent directions. In addition, the nascent institutional mechanisms of spatial planning are not mature enough to address these contradictions.

4 Insight from the field: five case studies

This section presents five case studies to discuss how the land issues identified and explained above play out in the local context. We first describe the methods and then present each case individually according to key themes identified above.

4.1 Methodology

4.1.1 Approach

Irrigated land tenure questions intersect the processes of water management and control (technical and social management of water) on the one hand, and land and natural resources tenure (land governance) on the other. Both of these processes are embedded in multi-scale agrarian dynamics (Figure 12). First, irrigation is shaped by agrarian transformations through the export-oriented and green revolution-like policies that Cambodia has embraced. Second, land tenure is influenced by intensification and/or agrarian expansion and the opportunities for agricultural growth and mechanization that come with it. These processes also introduce new forms of vulnerability (e.g., indebtedness) that influences social differentiation between smallholder farmers.

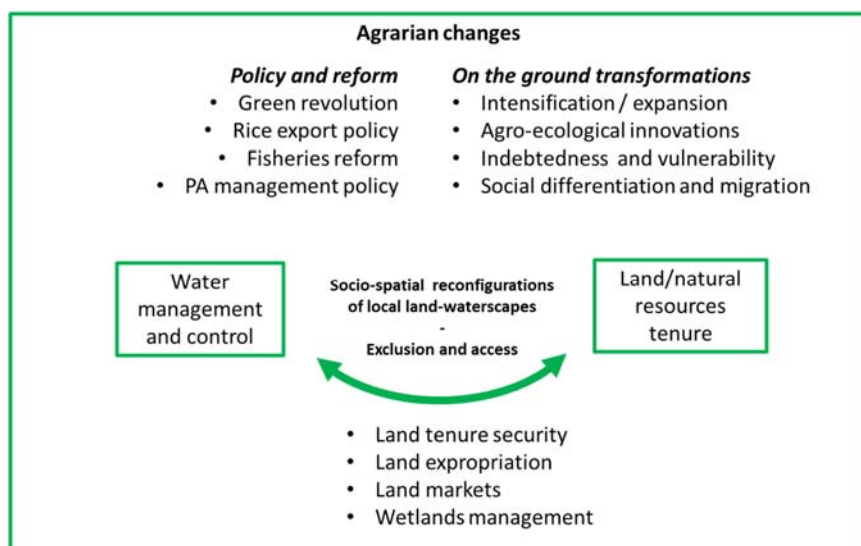


Figure 12. Analytical framework for field surveys

So our analytical framework is articulated around these two dimensions: land and natural resource tenure on the one hand, and water management and control on the other. The underlying question we formulate is the following: how does the management of and control over water affects the access to and/or the exclusion from land and natural resources tenure. We examine the inter-relations between both dimensions through key themes identified above: land tenure security, land expropriation, land markets and wetlands management.

The organizing proposition is that irrigation creates **socio-spatial reconfigurations** by introducing new forms of exclusion and access to the resource system (land and water) for smallholder farmers. **Socio-spatial reconfigurations** and exclusions are addressed at two levels.

- *At the command-area level*, we examine how practices of local actors shape the relative availability of water within the command area. Beyond engineering work that sets the physical possibilities of water distribution, the institutions devised to manage water have a prominent role in determining access. In Cambodia, actor networks mobilized around

water are heavily structured and influenced by patronage rules and the authority lines of the State (Deligne, 2014). This largely plays out in terms of decisions regarding construction or rehabilitation of irrigation infrastructure and the form taken by irrigation institutions, but it has also a bearing on the daily decisions that Water Users Associations (locally known as farmer water user communities -FWUCs) can effectively make and on the control these groups have over the resources (Ivars & Venot, 2019). Another dimension relates to the commodification processes through which agricultural outputs are produced for and inputs obtained from market exchanges. In Cambodia, resources commodification heightens the influence of market volatility and leads to increased risks of losing economic assets including land (Diepart & Middleton, 2022). We examine how these processes influence land and natural resources management practices within and outside the command area *per se*.

- *At community/village level*, smallholder farmers are not equally equipped to navigate the transformations at play in the irrigated areas. Assets and income distributions are usually skewed, and the capacity of farmers to adopt innovation, and embrace irrigation-driven agricultural intensification, can differ considerably. Likewise, their ability to manage risks and economic vulnerability varies greatly within villages. We examine the land market mechanisms underlying these dynamics and question to what extent irrigation drive new or exacerbate pre-existing dynamics of socio-economic differentiation between smallholders within farming communities.

4.1.2 Study areas

We conducted fieldwork at five irrigation systems, as shown on Figure 13. The sites were selected to represent the diversity of irrigation system captured in the typology described above.

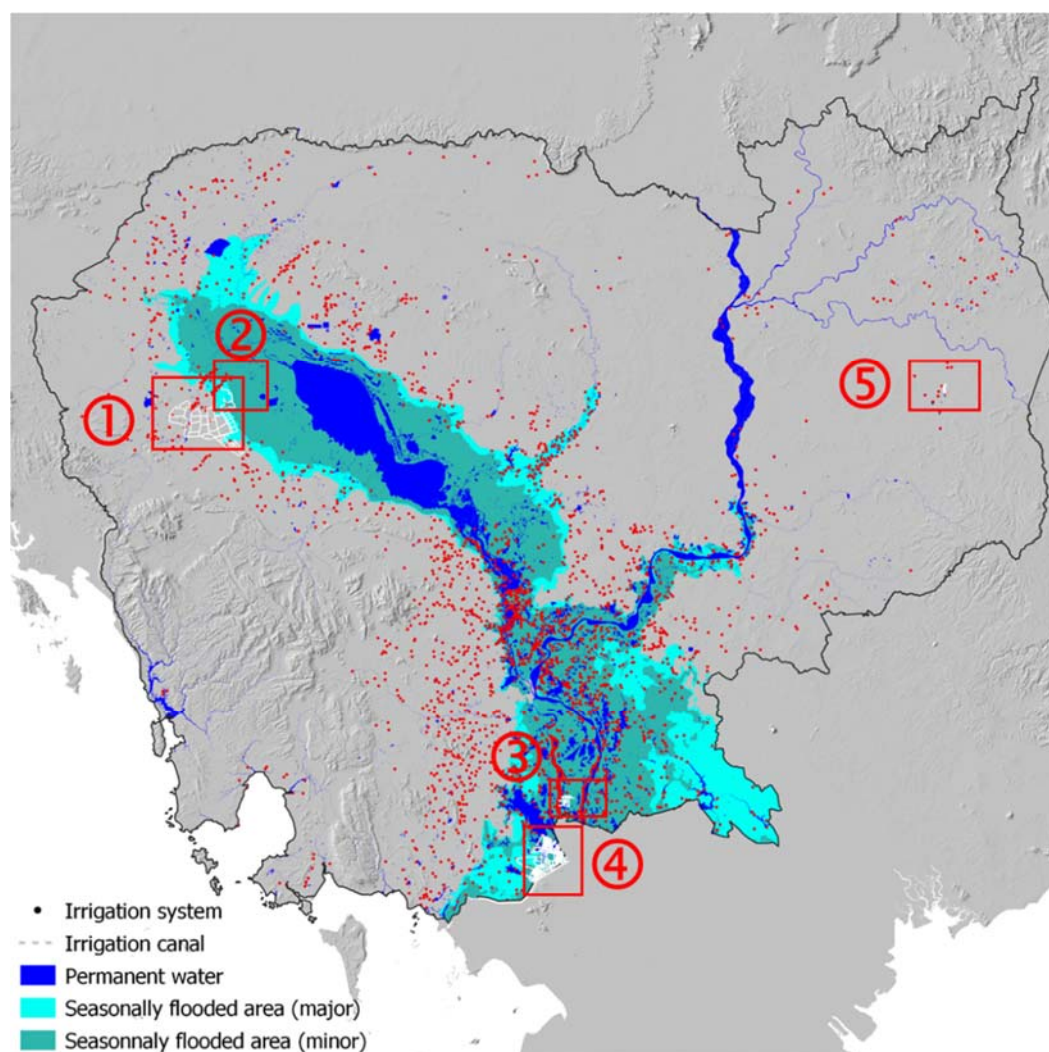


Figure 13. Situation map of the study areas.

Table 3. Characteristics of study sites

	Name of IS	Hydrographic basin	Type of IS	Province	District	Commune	Village
1	Kanghot	Tonle Sap	NF1	Battambang	Sangkae	Reang Kesei	Kampong Kau and Reang Kraol
2	Ou Sanda	Tonle Sap	F1b	Battambang	Sangkae	Kampong Preah	AUndoung Trach Preah
3	Prek Trapeang Chrey	Mekong-Bassac South	F2	Kandal	Kaoh Thum	Chheu Khmau	Trapeang Chrey
4	Prasac	Mekong-Bassac South	F1b	Takeo	Kaoh Andaet	Prey Yuthkaa	Ta Nhuem, Prey Bay, Ta Phin, Ta Phan, Ta Hien and Pong Andaeuk
					Borei cholsar	Chey Chouk	Chey Chouk
5	O'Prang	Mekong North	NF1	Mondul Kiri	Kaoh Nheak	Sar Huy	Srae Huy

4.1.3 Fieldwork

We conducted qualitative field research in several villages (Figure 13 and Table 3) over two weeks in August-September 2021 and then in February 2022. Fieldwork was affected by COVID and, while conducting the fieldwork, we purposely limited group discussions to a maximum of five people.

At each site, we followed a similar sequence of activities and interviews. We first organized a meeting at the provincial department of water resources and meteorology to present our objectives, seek general knowledge about the development of irrigation in the province and gain more specific information about the irrigation system we had selected for the fieldwork. Second, we did a quick field reconnaissance survey to visualize the irrigation system and understand the way it is structured. At the village level, we conducted several key informant individual interviews with representatives from local authorities, and from the farmer water user communities (FWUCs) to understand and contextualize key land issues in each system. Further, we organized focus group discussions in each village and different follow-up interviews to gather farmers' perspectives on these issues. In total, we consulted 94 people.

To facilitate all discussions, we used a series of maps that helped to render the information spatially explicit (see photo below). We used QGIS for spatial analysis and map production.



4.2 Kanghot: a large-scale irrigation system in the rice plain of Battambang province⁶

4.2.1 Description of the irrigation system

Kanghot irrigation system was constructed in 1976 under the Pol Pot regime, abandoned during the civil war, and then rehabilitated in two phases (2009-2013 and 2014-2015). The total command area of the phase 1 system covers 47,000 ha. Figure 14 shows that it consists of two general main canals (GMCs) and five main canals (MCs). Under phase 2, two additional hydraulic units covering more than 17,500 ha were added to the southern and eastern ends of the scheme. It now consists of two main canals (Figure 14).



⁶ This section partly derives from an article Diepart, J.-C. and Thuon, T. (2022). Exclusions in the Cambodian irrigation sector: perspectives from Battambang province. Cahiers Agriculture, ...

Both rehabilitation phases and the construction of the multipurpose dam at Sek Sak (irrigation and hydropower) were funded through a concessional loan from the Eximbank of China, and the construction contract was awarded to a Chinese company



(Grimsditch, 2017). The management and operation of the headwork of the Kanghot scheme are now under the control of the Provincial Department of Water Resources and Meteorology (PDoWRAM) (Schiele et al., 2020). Water management and the maintenance of each MC is the responsibility of the FWUCs, which are local community-based organizations whose roles also include the collection of water service fees. The provincial department of MoWRAM ensures the coordination of the five FWUCs.

We conducted qualitative field research in two villages – Kampong Ko and Reang Kraol (Figure 14). Both villages represent contrasting situations in terms of irrigation intensity. Kampong Ko is located within the core of the command area with high availability of water (Block A-B), while Reang Kraol is located more peripherally and has less available water (Block D).

4.2.2 Land tenure security and expropriation

The construction of infrastructures that took place during the rehabilitation and expansion of the irrigation system led to cases of land expropriation. The process, overseen by an *ad hoc* committee (see above), prioritized the identification and valuation of land to be expropriated along the general main canals and the main canals (up to 18m from the canal). The rice field land was valued at USD3,000/ha, slightly more if there were trees and/or if the land was part of the settlement area. The compensation took place without complaints from farmers. By the time of our study, a similar process was taking place in secondary canals, but compensation has not yet been paid. As for tertiary canals, the land loss incurred by the farmers is considered to be their contribution to the irrigation system.

During the process, however, some specific areas were identified as ‘traditional’ water bodies or streams that are considered State property according to the sub-decree on river basin management (Royal Government of Cambodia, 2015a). The identification does not take into account the current use of the land as the expropriation committee uses 2001 topographic maps showing the location of these water bodies back then, i.e., upon the release of the Land Law. Because they are considered State land, these areas are not eligible for compensation, which can be problematic as many of these traditional streams and small lakes are filled in and converted to agricultural land.

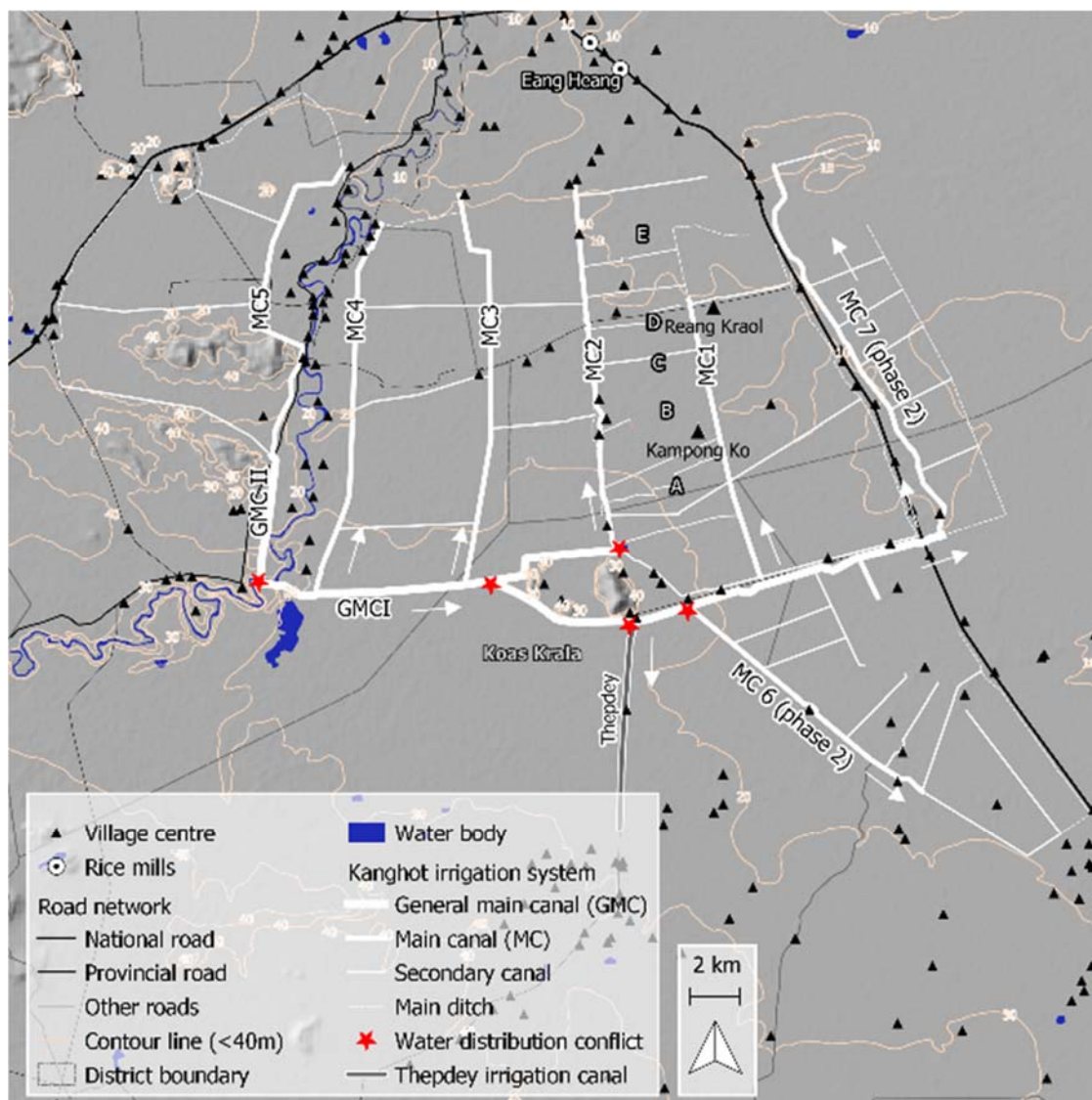


Figure 14. The Kanghot irrigation system in Battambang province and the location of the two study villages (Reang Kraol and Kampong Ko)

Source: mapping by the authors based on: Schiele, Vandome, Corsel, and Khoun 2020; Schiele, Vandome, and Khoun n.d.; Google Earth imageries and field reconnaissance by the authors

This issue notwithstanding, the agricultural land within the command area has been entirely under cultivation since before 2001, and, as such, it is eligible for titling. In practice, however, most of the land located in blocks A-B-C-D-E is not yet titled, but AFD has committed to offering titling services to cover the entire area where the project operates (Thepdey, Kampong Pring, and Reang Kessei).

According to all respondents, however, there is no major difference in terms of land tenure security between land certification (soft titles) and titles (hard titles). Land certificates, issued by local authorities, are widely available throughout the command area, and farmers enjoy the same level of security, as land distribution in the eighties took place in a relatively peaceful and decentralized manner. In addition, Micro-Finance Institutes (MFIs) accept soft titles to collateralize credit, so the absence of a title is not a hurdle in that respect either.

4.2.3 Land markets and agrarian changes

Uneven distribution of water across the irrigation scheme

Water is unequally distributed across the command area. MCs 5, 4, and 3 cannot be used without considerable pumping (Schiele et al., 2020), and investment in the building of secondary and tertiary canals is limited as a result. Only the command area supplied by MC2 and MC1 can be irrigated by gravity. As such, it has become the core area of the irrigation system. Multiple donor interventions are enabling the construction of secondary and tertiary canals, as well as agricultural research and development services and support for FWUCs to achieve effective water management. This core area has been divided into blocks A-B-C-D-E (Figure 14) for management purposes. There is a gradient of water availability from south to north, blocks A-B being better supplied than the other three. In blocks A-B, farmers are now growing up to three cycles of rice per year while irrigation in blocks C-D-E is limited to the dry season, and to the diversification of non-rice crops.

One or two MCs are managed by a FWUC but the coordination between FWUCs at the provincial level by the technical department in charge of water was considered not very effective by our local-level respondents. Water management is further challenged by the exercise of power and the use of force by influential and well-connected individuals engaged in agricultural businesses within and beyond the command area. The area south of GMC I falls mainly within the Koas Krala district (Figure 14) - an area where post-war land management has given rise to conflict due to massive land grabbing perpetrated by people in the military (Schneider, 2011). They later transferred land to a business tycoon who claimed 5,144 hectares in three communes of the district (Sun, 2020). In this context of violence and significant inequality in land access, the use of force and intimidation in water allocation is barely surprising. These tensions were palpable during our discussions, as exemplified by one of our respondents:

In the beginning, access to water was anarchic, the first-come was the first-served. Water distribution conflicts occurred in many places [he shows the locations on the map]. It is now slightly better since they have established the FWUC, but the risks are still there. In 2018, things got very hot when a well-connected agricultural entrepreneur tried to break the MC2 to divert water to his fields outside the command area.

Figure 14 shows the locations where tensions and sometimes violent conflicts have erupted between farmers' groups or with well-connected agricultural entrepreneurs who were trying to divert water away from Kanghot towards its southern tail-end, for instance along the Thepdey canal constructed in 2007.

Well-connected landowners who own land in the Tonle Sap floodplain have attempted to divert water from Kanghot to the east, too. The testimony of one respondent gives an example of how inequality in water distribution materializes:

Last year, water distribution was unfair. MC1 to MC4 (four main canals) received water only for six days while MC6-MC7 received water for seven days. This was to the advantage of a [well-connected person] who owns large rice landholdings along the national road. This is unfair because there are far fewer secondary canals in this area and the water benefits far fewer farmers.

Modernization of agricultural practices

Based on village focus group discussions, Figure 15 depicts some elements of the recent agrarian history of the villages from 1980 to the present.

Recent surveys conducted by WAT4CAM (TA-INFRA and R4D components) emphasized that over 90 percent of the farmers are engaged in a process of agricultural intensification: intensive plowing, improved rice varieties, fertilizers, and pesticide use (Vernet et al., 2021). The effect of the intensification of rice production and commercialization since 2010 stands out clearly. Processes of mechanization, land market transactions, reliance on micro-credit, and job

migrations were all initiated in the early 2000s but have accelerated considerably from 2010 onwards. Increasing demand for rice commercialization incentivized the commodification of land-labor relations. The uptake of micro-credit (from a micro-finance institute or agricultural middlemen) has increased to cover the costs of agricultural inputs.

By choice or constraint, job migration is on the rise. However, it is complementary to family-based farming activities. It is mainly an attempt to maximize the use of their labor. Permanent and relatively stable migration includes a wide array of job and labor conditions, moving from relatively lucrative labor in Japan or Korea to jobs in garment factories close to the capital Phnom Penh, to casual labor in Thailand. Migrations also include more circular and seasonal movement, typically to border districts for the harvest of cassava, corn, longans, etc. Household livelihoods are ‘trans-local’, which means their labor and income strategies are now deployed in a much-diversified portfolio of activities and over a larger distance. Income derived from agricultural activities is often insufficient to cover family needs (particularly for farmers with small landholdings), but if farmers are not compelled to sell their land, family-based farming remains pivotal to local livelihoods.



Figure 15. Key characteristics of the evolution of agricultural and farmers' livelihoods along MC2, in Reang Kraol and Kampong Ko, Kanhhot irrigation system. Source: fieldwork by the authors

A consequence that unfolds from job migration is labor shortages, which have incentivized agricultural mechanization. Agricultural mechanization consists of a diversity of operations that cover the entire rice production cycle: land preparation (tractor), soil leveling, spraying of chemicals (fertilizers and pesticides), combine harvesters, etc. Despite the costs incurred, an increasing proportion of the farmers rely on external services because they are labor-saving and allow them to engage in more remunerative activities (when available). Vernet et al. (2021) note that service providers are farmers who own a relatively larger cultivated area (12.2 ha on average) than the average farmers in the MC2 area (approximately 3.2 ha per household). They describe a situation in which the market is saturated, insofar as only 33 and 29 percent of the tractor and combine harvesters, respectively, reach their break-even point⁷, emphasizing that most the agricultural services businesses are fragile and do not generate a high return on investment (Vernet et al., 2021). Yet they have become a structuring element in the agricultural development of the Kanhhot irrigation system.

These mutually reinforcing processes are part of a single logic of production in motion since 2010. However, it accelerated in 2014 when irrigation became operational across the command area and supported the intensification of rice production. One of our respondents, who can be considered a well-off farmer in the village, expressed this logic in her own words:

Overall, irrigation has improved the livelihoods of landed-households, particularly those with large landholdings. But we have all become highly indebted. So a lot of the benefits we gain are used to pay back to the micro-finance institutes.

⁷ Area for which a service provider covers his fixed and variable costs; 350 ha for a tractor and 171 ha for a combine harvester

Irrigation has increased the need for credit for several reasons

- In a context of decreasing soil fertility and soil compaction, the intensification of agricultural production processes (two or three rice harvests per year or the diversification into non-rice crops in the early season) comes with a sharp increase in upfront costs for fertilization, which accounts for 35-40 percent of the cost/ha (Lucas and Mias, 2021);
- Agricultural intensification also increases the need for cash to pay for the different agricultural services most farmers rely on. On this note, reliance on credit is paired with the increase in land price and land transactions associated with land sale/purchase and lease in/lease out. According to our respondents, land prices have singularly jumped from USD2-3,000/ha in 2010 to USD10,000 (Reang Kraol) to 15,000/ha (Kampong Ko) in 2021 (see Figure 14 for the location of villages). Land rental fees have also increased up to USD150-200/ha/in the cropping season across the command area;
- Credit is also associated with non-productive consumption, such as, typically, house renovation, purchase of motorbike, etc., which are usually acquired on credit. The increased livelihoods of some farmers have also created an appetite for consumption and the acquisition of non-productive items;
- Yet in a context where access to water remains uneven and agricultural markets are volatile, the increased level of debt increases risks and puts a higher burden on farmers. This finding echoes Green's observation (2021) suggesting that irrigation conditions have placed Battambang's rice farmers in a precarious position.

Figure 16 charts the trajectories of individual households against the overall timeline we briefly sketched above. During the land distribution from *Krom Samaki* (a collective production unit consisting of 10-15 households put in place in the early 1980s, but short-lived), the land was allocated to households based on their active labor. Likewise, their labor capacity allowed families to clear forested land and expand their agricultural landholding, though it was only for rain-fed rice production. Until the end of the 1990s, the differentiation in land access between families was based mainly on the households' labor capacity. By 2010, economic circumstances had changed due to the increased commercialization of rice and the commoditization of all aspects of production. The generalized uptake of credit for productive and non-productive purposes added another layer of risks and vulnerability to smallholder farmers. And the combination of climate hazards, bad harvests for several consecutive seasons, and/or the unproductive use of credit, put vulnerable smallholder farmers in a situation of re-payment default: if they did not have an alternative source of income, the family tended to tackle the crisis by selling part or all of their agricultural land. To compensate for this loss, they turned to job migration as local wage labor opportunities declined due to generalized mechanization.

We found that this general process of land sale/purchase has accelerated since the introduction of irrigation in 2013-2014, precisely because the uptake of credit paired with the development of irrigation has increased the risk and the occurrence of repayment default.

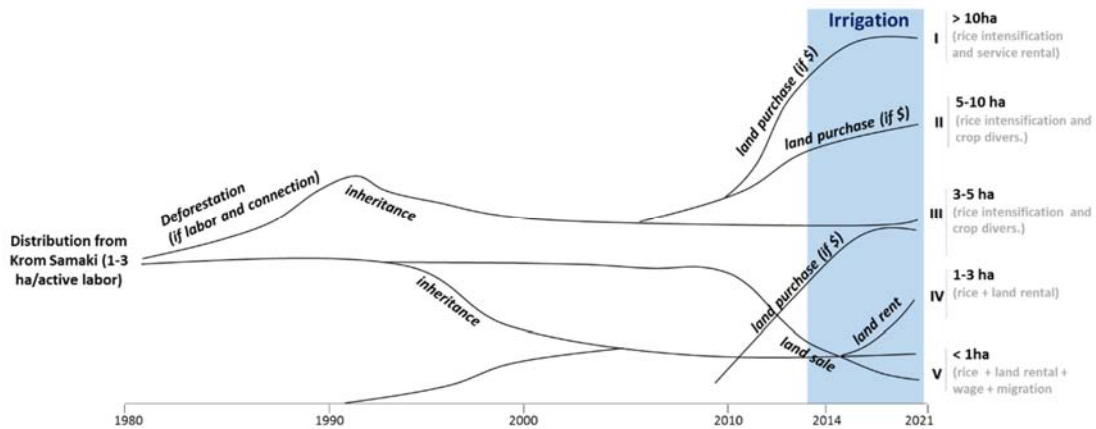


Figure 16. Trajectories and typology of activity systems in Kampong Ko and Reang Kraol. Key: The number in brackets indicates the percentage of households of each type in Kampong Ko (left) and Reang Kraol (right)

The process of socio-economic differentiation explains why the ability of farmers to benefit from irrigation is so unequally distributed (Figure 16). On the one hand, we find farmers who have accumulated land first through deforestation and now through land purchase and who achieve the largest benefit from irrigation (types I and II). On the other hand, we find farmers who are losing out on land through distress sales associated with debt repayment default and whose livelihood depends crucially on wage labor locally or often on migration. And mechanization means that demand for wage labor declines (types IV-V)

Interestingly, we found that this differentiation pattern is more advanced in an area where irrigation is more developed. In Kampong Ko village, where water availability is better, the share of farmers who belong to type I and type V is significantly higher than in Reang Kraol (Figure 17). This finding validates the fact that current practices of irrigation act as a catalyst for social differentiation.

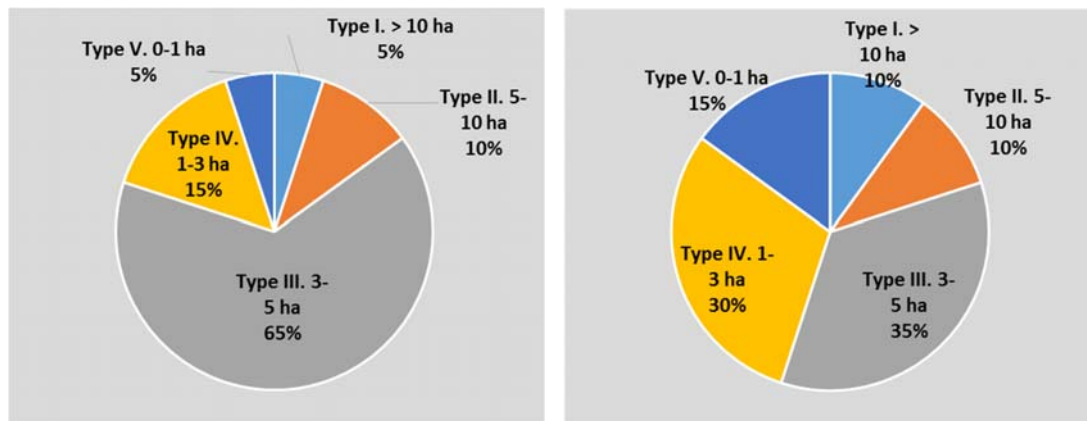


Figure 17. Representativeness of farming system in Kampong Ko (left) and Reang Kraol (right)

This mechanism of intimate exclusion, i.e., land accumulation/loss, is at work within villages but also well beyond. One type of land transfer that has become widespread in the main command area relates to transactions between outside landowners based in Battambang city who buy the land from an indebted farmer but rent it back to him. These transactions are driven by a couple of land-brokers active in the village who work for Battambang-based rice mill entrepreneurs or

jewelry-shop owners (Figure 14). They are usually Sino-Khmer families who have been investing their capital to accumulate land-based wealth. The main advantage of this type of transaction for the farmers, compared with selling the land to a fellow villager who wants to expand his agricultural landholding, is that he/she remains a tenant of the land and keeps an income-generating activity in the village. Outside landowners are perfectly aware of this and use this leverage to negotiate the price of the land with the seller.

This mode of land accumulation pre-existed the development of irrigation but has accelerated considerably since 2014. It is highly significant in scope, as one of our respondents who holds responsibility in a local water management group told us:

Many families who could not pay their debt to the micro-credit institute had to sell some or all of their land to these rich people from the city. They rent the land to continue growing rice there, but they don't own it anymore. In the MC 1-2 command area, about 40 percent of the households are in this situation, relatively more inside blocks A and B than in blocks CDE.

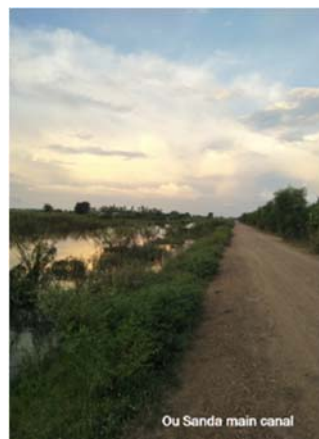
4.3 Ou Sanda: a small irrigation system in the Tonle Sap floodplain

4.3.1 Description of the irrigation system

Ou Sanda irrigation is a system with low-key infrastructures located in the floodplain of the Tonle Sap Great Lake (Figure 18). The Tonle Sap is a hotspot for biodiversity recognized by UNESCO as a Biosphere Reserve. Its unique flood pulse system and annual flow reversal create an area of intensive inland capture fisheries (Arias et al. Elliot, 2014). Because of its location, the Ou Sanda irrigation system illustrates a mix of issues relating to the multi-functional management of State land and resources.

Ou Sanda irrigation system was constructed with direct State funding on the eponymous stream. Water flows from the Kanghot irrigation system to which it is directly connected (see MC7 at Figure 14). The first segment was constructed in 2017, and the second segment, built in 2019, led to a private large orchard farm. It merely consists of the excavation of a canal that farmers can access through private investment (pumps, secondary canals, etc.) to bring water to their fields.

Similarly to Kanghot system, irrigation water is primarily used for early wet season rice production and to supplement water for rain-fed rice, including occasionally deep-water rice. Yet, the water supply limits the command area to 300-500 meters on both sides of the canal (Figure 18), because farmers need to pump water from the canals.



4.3.2 Land tenure security and expropriation

The identification of land to be expropriated was conducted by an *ad hoc* inter-ministerial expropriation committee. As in the case of Kanghot, the compensation scheme is based on the 2001 land use. Areas identified as water bodies or streams in 2001 are considered State land, irrespective of current land use, and are not eligible for compensation. As most of the Ou Sanda irrigation canal has been excavated from an old stream, barely any compensation was offered to the farmers.

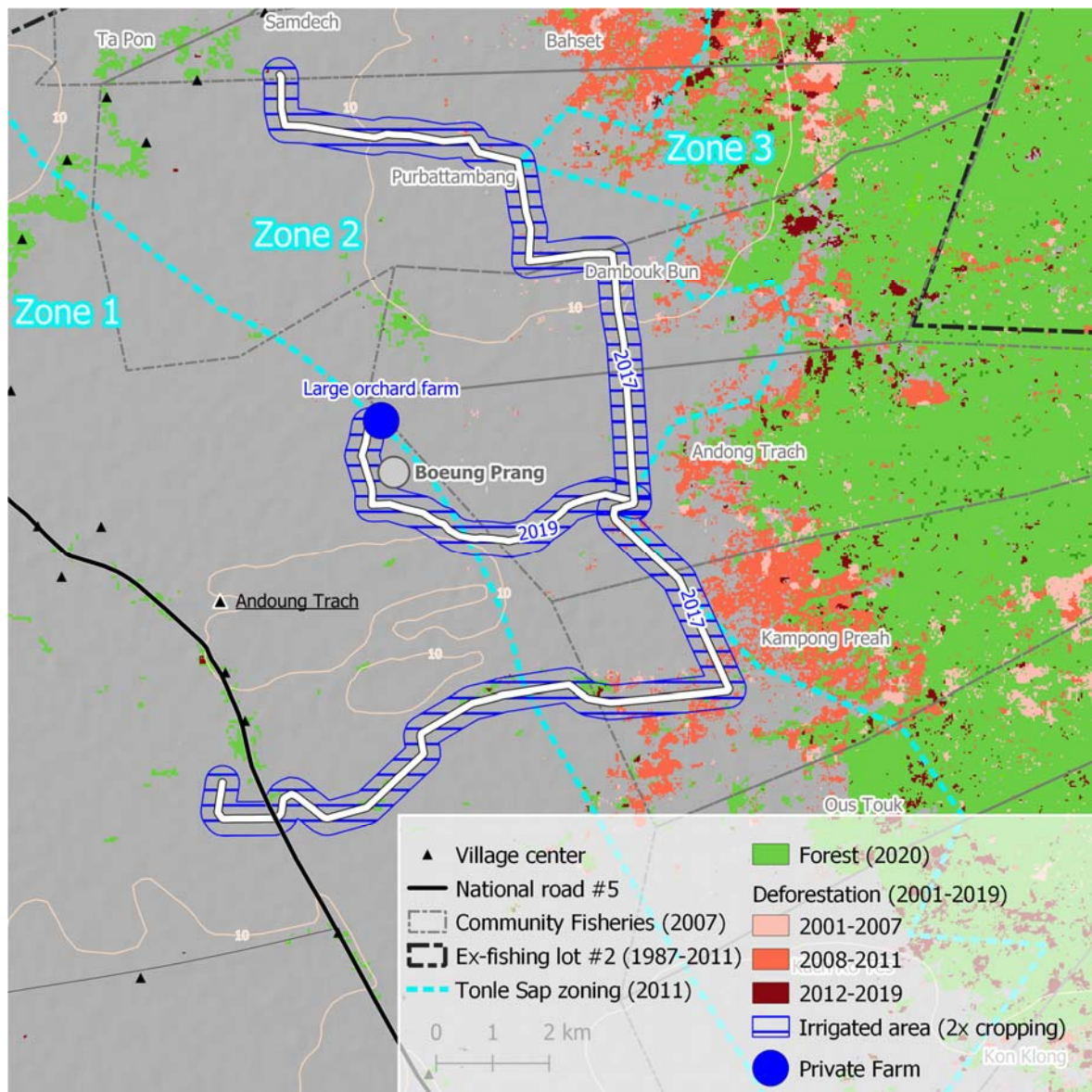


Figure 18. Ou Sanda irrigation scheme, territorial expansion of agriculture, Community Fisheries and Tonle Sap zoning in Andoung Trach village.

Source: Mapping by the authors based on Google Earth imageries (Royal Government of Cambodia, 2011c), (Fisheries Administration, 2014), deforestation analysis conducted with Hansen et al., Hansen/UMD/Google/USGS/NASA)

4.3.3 Land markets and agrarian changes

During a focus group discussion, we asked the respondents to identify different wealth groups in the village based on their perceptions of socio-economic differences between families. They came up with four main wealth classes; the first two correspond to Poor 1 and Poor 2 an official multi-criteria poverty classification conducted by the Ministry of Planning.⁸ The other two classes relates to respondent own classification.

With 40 percent of landless households, land concentration is well advanced in the village. It results from the interaction and synergy of three land acquisition processes: the land distribution from *Krom Samaki* (households with larger land holdings acquired their land mainly through this redistribution), land expansion into the floodplain in the nineties (see above), and wealth-biased land purchase and sale markets.

Due to the limited size and the location of the command area far into the floodplain (Figure 18), the distribution of the irrigated land area is very uneven. It favors households who have expanded their landholding into the floodplain since the nineties (beyond the land managed under the *Krom Samaki*). Poor landed households do not have land inside the command area. Just a few households of the middle group cultivate land inside the command area and, for those who do, it represents approximately 50 percent of their landholdings. All the better-off households cultivate land inside the command area. In sum, irrigation principally benefits farmers who have large agricultural landholdings.

The process of land accumulation is correlated with the increasing reliance on wage labor; households with smaller agricultural landholdings sell relatively more than others their labor on wage markets (Figure 19). Agricultural wage labor opportunities exist in the village (application of fertilizers or pesticide and rice broadcasting) and wage labor outside the village consists mainly of jobs in the construction sector in Battambang city (15 km away). The incidence of job migration to Thailand has become significant since 2010 among the young and mid-age adult generations. Migration changes the land/labor balance of families involved; it affects their capacity to invest in village-based activities such as livestock production and self-employed non-farm activities (small businesses, petty commodity shops, etc.).

All households are somewhat involved in fisheries and thus impacted by the decline in the fisheries described above. However, it has had a greater effect on the poorest because they depend relatively more on the fisheries (Figure 19). As fishing is an important dry-season activity that complements agriculture, the decline in the sector is a factor that pushes wage labor outside the village and to Thailand.

Labor shortages have incentivized the mechanization of agricultural production. Families with larger landholdings are better equipped with agricultural equipment but also rely more on the agricultural services offered by service providers (tractors for ploughing, combine harvesters, etc.)

The marketization of all activities and access to credit and indebtedness is generalized and a structural element in the local economy, notwithstanding irrigation. As one of the respondents told us:

Credit is the main concern in our village now. Everyone is in debt somehow. Some days, there can be up to 20 staff from the MFI in the village to monitor the repayment of debt... Everyone borrows but the amount and use of credit are very different between households. Better-off households will borrow up to USD10,000 to buy land or expand their small businesses, while the very poor borrow less - up to 1 million KHR⁹ - for survival expenses (food, health, etc.).

But formal credit does not mean that informal money lenders have disappeared. They remain an important source of credit for families who cannot collateralize land to MFIs.

⁸ <https://mop.idpoor.gov.kh/>

⁹ Equivalent of USD250

	Very poor	Poor	Middle	Better-off
Percentage of households	99	25	116	7
	40%	10%	45%	5%
Agricultural land area	0	1	3	5
	(Landless)	(< 1ha)	(1-5 ha)	(> 5ha)
Rice area	0	3	5	5
Irrigated land	0	0	3	5
Wage labor in village	2	2	1	0
Wage labor agriculture out of village	1	1	0	0
Wage labor construction in Battambang	3	3	2	0
Migration (Thailand)	5	4	1	0
Livestock production	1	2	5	5
Self-employed non-farm activities in village	0	0	2	3
Fisheries	5	5	3	3
Agricultural equipment	0	0	5	5
Use of agricultural services (e.g combine harvester)	0	0	5	5
Formal credit	1	2	5	5
Informal credit	3	3	0	0
Land purchase	0	0	1	1
Land sale	0	0	2	3
Land rent-out	0	1	0	0
Land rent-in	0	2	3	2

Figure 19. Wealth ranking and qualitative assessment of livelihoods in Andoung Trach
 Number (and color) are proportional to the level of involvement/significance of the activity for the different groups: Key: 0 = not relevant/not involved; 1=very low; 2= low; 3= moderate to high; 5= very high

The underlying forces and processes that shape the socio-economic differentiation between households are long-enduring and have little to do with the Ou Sanda irrigation system. However, irrigation development in the village has boosted land prices (see Table 4 below) and land transactions in ways that have reinforced the patterns of land accumulation and social differentiation sketched above.

1. Irrigation has incentivized outsiders or well-off farmers from Andoung Trach village to buy land located inside the command area to expand their agricultural operations. The households who sold their land were usually landed households wanting to invest in non-farm businesses.
2. Unlike the situation in Kanghot, there are just a few cases where indebted farmers have sold land to money lenders and rented it back from the new owner.
3. Land lease occurs but is mainly a way for landed and relatively poor farmers to expand their agricultural operation, and who rent land from land-rich farmers who do not have the capacity or interest in cultivating all of their land themselves.

Table 4. Comparison of land prices before and after the introduction of the irrigation system in Andoung Trach village

Zone	Before	After
1	3,500-4,000 USD/ha	5,000- 10,000 USD/ha, according to the distance to the canal and the availability of irrigation water
2	2,500-3,000 USD/ha	5,000- 10,000 USD/ha, according to the distance to the canal and the availability of irrigation water
3	Officially, sales/purchases are not allowed in Zone 3 but transactions have occurred before and after the construction of the irrigation system	

4.3.4 Multi-functional management of wetlands

Land and natural resources management before the irrigation

Land and agricultural dynamics at play before the construction of the irrigation system are multi-fold:

Agrarian expansion into the floodplain

Agricultural pioneering into the floodplain for rain-fed and deep-water rice cultivation has been taking place in the area for at least four decades (Figure 18). It was originally driven by local farmers who could expand their agricultural landholding outside the area of agricultural land redistributed from the *Krom Samaki* (in present-day Zone 2 or Zone 3). Since 2008, the process of forest clearance of these pioneer farmers attracted agricultural entrepreneurs from Battambang willing to invest in land and medium-scale rice production. The contribution of these new actors (and the smallholder farmers they hire to clear the land) has been significant in terms of flooded forest deforestation. It is a trend identified elsewhere in the province (Sok et al. 2019).

Fisheries reform and the Andoung Trach Community Fisheries

The Community Fishery (CFi) of Andoung Trach was created in 2007 along with many others around the Tonle Sap, as part of the fisheries reforms (see above). It covers an area of 4,538 ha with 802 registered members. The resources managed by the CFi include the fishing ground (ponds and open water seasonally available) and a large fish habitat consisting of grass, shrub, forest, and agricultural land. Agrarian expansion described above started before the creation of the Community Fisheries but intensified after it was created, which resulted in an increase in tensions between farmers and fishers. In 2012, the hope raised by the cancellation of fishing lot #2 was short-lived among local fishing folk. The opening of the fishing frontier created a space for opportunism, attracting commercial middle-scale fisher folk (mostly previous fishing lot owners and operators) who have continued to enjoy tacit protection from powerful people. They took advantage of the institutional vacuum left after the cancellation of the fishing lot to pursue their activities and enclose the fishing grounds, using mostly illegal fishing equipment (Diepart et al., 2019). As a result, the floodplain fishing ecology and fish spawning grounds have deteriorated and the decline in fish catch per unit effort has remained a central problem for all members of the Community Fishery (Diepart et al., 2019). The reluctance - or slow responsiveness - of the provincial administration to crack down on illegal fishing, coupled with ineffective co-management arrangements, have left the CFi helpless and powerless to address problems.

Zonation of the Tonle Sap

Shortly before the cancellation of fishing lot #2 in 2012, the Tonle Sap Authority (TSA) released a plan to conduct a zonation of the Tonle Sap plain with the stated objective to protect natural resources across it (see 2.5 above). Figure 18 shows the boundary of each Zone in Andoung Trach village.

- Zone 1 is an agricultural and settlement area where agricultural land is eligible for titling.
- Zone 2 is a multiple-use area (agriculture and fisheries). Agricultural land is not eligible for titling but farmers are allowed to cultivate it, and have recognized usufruct rights on the land.
- Zone 3 is the so-called flooded forest where agricultural activities are prohibited. Yet Figure 18 shows that the agrarian expansion into the flooded forest (including inside Zone 3) continued after the release of the sub-decree. In fact, up until recently (2022), there has been no boundary post that demarcates the limit of Zones 2 and 3 on the ground. And combined with the absence of proper enforcement by the Tonle Sap Authorities, the zoning has remained a vague and relatively meaningless territorial division for the people.

Flooded forest protection and Community Fisheries management

As shown in Figure 18, the Ou Sanda irrigation canal is located at the edge of Zone 2. The command area, albeit small (300-500 m on both sides of the canal), is partly located inside Zone 3 and represents one further incentive for agrarian expansion eastward to the Tonle Sap plain. As such, it is in complete contradiction with the Tonle Sap zonation, which prohibits agricultural activities inside Zone 3 delineated for flooded forest protection. The Provincial Department of Water Resources and Meteorology, acting both as the secretariat of the Tonle Sap Authority (TSA) and the promoter of the Ou Sanda irrigation, has not been able or willing to address this contradiction.

Likewise, the Ou Sanda irrigation system cuts the Community Fisheries of Andoung Trach into two parts (Figure 18). The fisheries administration was involved in the feasibility study for the Ou Sanda irrigation system, but considered the investment not to be a threat to the fisheries resources and the Community Fisheries management (interview). Yet villagers in Andoung Trach have been experiencing the impacts of agricultural development into fisheries since the creation of the Community Fisheries in 2007 (destruction of fish habitat in the flooded forest, pumping of fishing pond water for supplemental irrigation, and a decline in the fish stock due to the use of agrochemicals). The introduction of irrigation exacerbates these issues and adds challenges as people fish anywhere there is water (canal, rice fields, and so on). The irrigation creates further mobility problems and limits the size of the fishing ground. Now fishing is mainly for family consumption and has ceased to be a remunerative activity for local fishers during the dry season.

The fisheries were already in a state of decline and collapse (see above) before irrigation came in. But the Ou Sanda system has accelerated the decline process: the reduction in small-scale fisheries (whose activity is very important in the dry season as a complement to rain-fed rice production), fisheries privatization of resources that were held in common. In other words, irrigation is yet another factor that threatens fisheries and jeopardizes the management of Andoung Trach Community Fisheries. It adds to a long history of tensions between the development of agriculture and small-scale fisheries, particularly following the cancellation of fishing lot #2 in 2011 and beyond (Serey and Yu 2021).

Up against this social-ecological collapse, the CFI management decided to refocus its efforts on a much smaller protected pond (*Boeung Prang*) located outside the CFI area (Figure 18). There, local fisher folk enjoy more control over their resources and have instituted local rules to manage and protect fishery resources more effectively (Diepart et al., 2019).

4.4 Trapeang Chrey: an irrigation system built around a prek in Kandal province

4.4.1 Description of the irrigation system

Trapeang Chrey village is in Chheu Khmau commune, Kaoh Thum district, Kandal province. Like many villages along the Tonle Bassac, Trapeang Chrey is equipped with a prek, which is a hydrological unit that consists of a canal directly connected to the main river, that brings water and sediments to a lowland area called a *boeung* (see Figure 20 below) and supports intensive agriculture (rice and *chamcar*). The resources system is a complex and fragile ecosystem that faces increasing pressure.

The canal is the structuring element of the landscape. On both sides of the canal, the *chamcar* area is a non-flooded upland used for settlement, physical infrastructure, and intensive agriculture. Down in the floodplain, the lowland area is called a *boeung*, an area that is seasonally flooded but used in the dry season for agriculture and fisheries, and livestock grazing (Vandôme 2020).





The lowland plain is connected to the river *Steung Chrouy Snao* from the eponymous village located in Preaek Chrey commune (Figure 20). In the dry season, floodwater drains into *Steung Chrouy Snao* but the river serves also as a source of water (transferred by pumping) to support dry season agriculture in the *boeung*.

Since the Khmer Rouge period, the prek system has been supplemented by a nested irrigation system. The most important element is the so-called Prek Samaki, built in 1969, that distributes water southwards into canals 11, 12, 13, and 14 (Figure

20). Altogether, the flows of water are multi-directional depending on the season and the equipment used to control them.

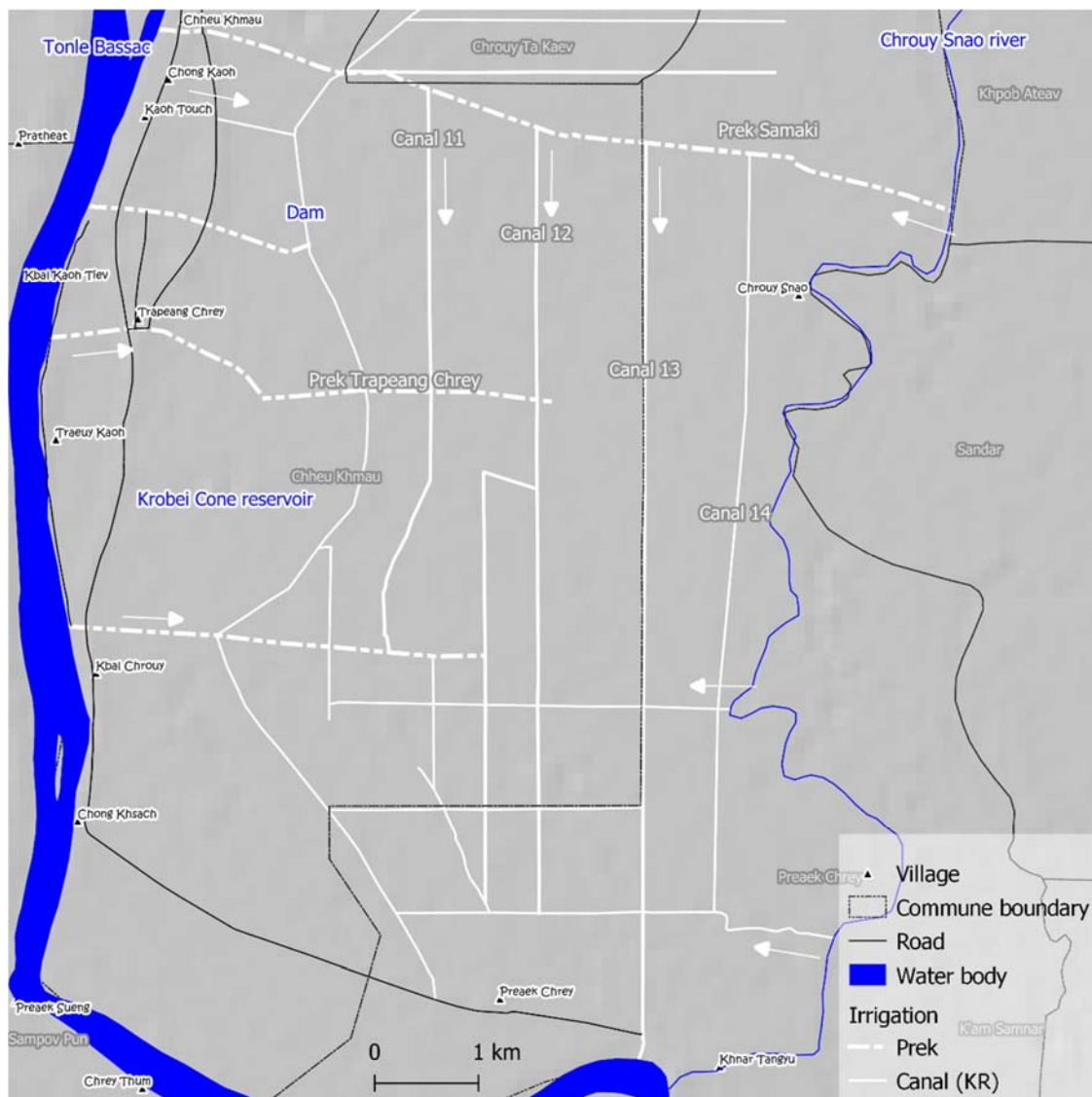


Figure 20. Prek and irrigation system in and around Trapeang Chrey and Chrouy Snao villages

4.4.2 Land tenure security and expropriation

The irrigation system has been in place for many years. As such, its rehabilitation is not subject to expropriation. As in the case of the Kanghot and Ou Sanda irrigation systems, land tenure security issues are elsewhere. A review of the agrarian history that connects the life of people and natural resources of Trapeang Chrey and Chrouy Snao villages is necessary to understand the cause of these issues.

4.4.3 Multi-functional management of wetlands

Before the Khmer Rouge period, the prek system was in operation with a relatively low level of control (Figure 21, A).

Khmer Rouge period (1975-1979)

During Khmer Rouge turmoil, the *Angkar* (who headed the regime) had plans to build large-scale irrigation infrastructures to improve water control for rainy and dry season cultivation. Massive labor investments were needed to build the Kone Krobei reservoir (Figure 21, B) used to store water and irrigate the hinterland crops. These efforts were also the driving forces behind the construction of canals 11 and 12 which are connected to Trapeang Chrey prek. Since then, the prek and the canal have been subject to rehabilitation initiatives: enlargement, excavation of natural vegetation, and sediments.

These efforts meant that, by the end of the seventies, the entire area was potentially suitable for agriculture (Figure 21, B). People were cultivating rice, corn, and leguminous plants. These efforts represent an important legacy that continues to weigh heavily on contemporary agricultural dynamics because they set the target of what is achievable for agricultural development.

Whereas much attention was spent on Trapeang Chrey village in Khmer Rouge times, the village of Chrouy Snao was abandoned during this period (Sinh, 2022). Villagers from Chrouy Snao were forced to relocate southward to Khnar Tangyu where they also contributed to canal building efforts (Ibid.).

Krom Samaki period and the introduction of the fishing lot (the eighties and nineties)

After the Khmer Rouge regime, many families who had been forced to work in Chheu Khmau commune building canals in and around the Trapeang Chrey prek, went back to their home village. The population of Trapeang Chrey declined, but there were still around 400 households. Agricultural development efforts were maintained under the *Krom Samaki* system, albeit on a smaller agricultural area given the lower population (Figure 21, C). The land was allocated to groups of 10 families (the *kroms*), who were given the right to cultivate up to 500 meters after canal 11 (also known locally as canal 11.5). Some families could gain access to the land beyond canal 11.5 via connections with local authorities and this prior access is important in understanding the present-day situation (see below). In Chrouy Snao, no *krom samaki* were established and people relied mainly on fisheries as a primary source of livelihood and income, and bartered fish against rice with Vietnamese traders in Chrouy Snao (Sinh, 2022). They also conducted small-scale agriculture (mungbean, and black bean production around settlements). As a result, the area quickly became covered with a dense flooded forest, shrubs, and grass.

By 1987, the situation changed further when the government established the fishing lot system (see above). Fishing lot number 10 became a structuring element in the agricultural landscape (Figure 21, C). In Trapeang Chrey, when the fishing lot was in operation (the so-called open season, from December to April), the area was closed to local fishermen. Some dry season agricultural activities were accepted by the fishing lot owners and sub-lessees but were far from the main water sources. In the beginning, the pressure for agrarian expansion into the *boeung* was limited and there were not yet many agriculture-fishing conflicts. During the remainder of the year (the closed season, from May to October), the area was accessible for small-scale fisher folk). Back then, the fishery was the main source of income for smallholder families in the area. In Chrouy Snao village, local families were allowed to grow soybeans but

agrarian expansion was restricted due to the massive presence of a fishing lot (Figure 21, C), and fishing remains the principal source of income for the local population.

By the end of the nineties, however, some clearance of flooded forests started with the support of local authorities who facilitated the rental of the necessary heavy machines. The incentives applied to both sides - east of Trapeang Chrey and west of Chrouy Snao. Canal rehabilitation was in part supported through the 'Food for Work' program implemented by the World Food Program.

Locally-driven agrarian expansion (from 2002 to 2012)

From 2002, the newly elected commune councils of Chheu Khmau and Preaek Chrey started to inject some local funds into the rehabilitation of the prek and canal that had been left unrehabilitated after the Khmer Rouge time. In 2012, the Ministry of Public Works and Transport provided support to renovate the road along Prek Samaki and rehabilitated the prek.

They have also encouraged agrarian expansion by facilitating the rental of machinery to clear flooded forests. In Trapeang Chrey village, farmers managed to expand their farmland to 500 meters east of canal 12 (a limit locally known as 12.5) which officially set the area up to which local authorities are allowed to issue land certificates. As one of our respondents (local authority representative) explained:

As a local authority representative I know and recognize (issue land certificates) on land only up to canal 12.5. Beyond that limit, I know that people and local farmers have acquired land but I have nothing to do with their land.

A similar process applies to Chrouy Snao village, albeit relating to a much smaller area given the importance of fishing operations under lot numbers 9, 10, and 11. These movements, stretching well beyond Trapeang Chrey village, have had significant impacts in terms of land cover. Based on a land cover change assessment conducted over a larger area (the southern part of Kandal province), Venot (personal communication) shows that from 2000 to 2011, two-thirds of the dense natural vegetation had disappeared, while the remaining third has been degraded.

According to our respondent in Trapeang Chrey, 2005-2006 represents a milestone after which agriculture became the dominant activity (over fisheries) in the livelihoods and income portfolio of the local population. The expansion of farmland into the fishing lot (Figure 21, D) has created tensions between farmers (and their supporters) and fishing lot owners and sub-lessees as well as with the local fisheries administration. Conflicts between these actors are rampant.

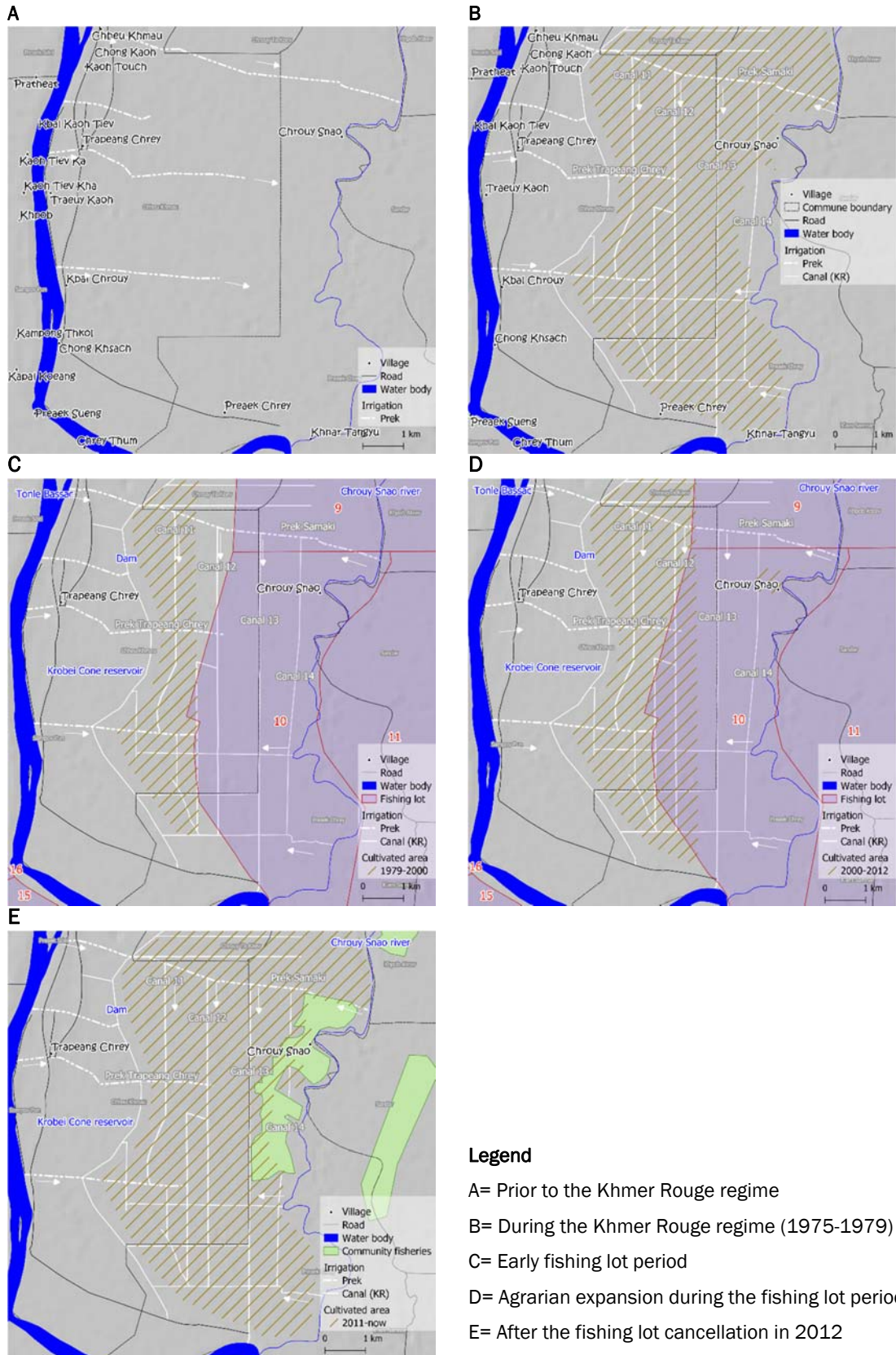


Figure 21. Evolution of land and natural resources management in Trapeang Chrey and Chrouy Snao villages

The recent development of the irrigation system

Soon after the rehabilitation of Prek Samaki in 2012, the State continued with canals 11 and 12. Further, local authorities in Chheun Khau borrow pumping machines from the PDoWRaM to bring water from Prek Samaki into canals 11, 12, and 13 (see Figure 21). Some blocks have even been installed in the eastern part of Prek Samaki (between canals 12 and 13) to prevent the water from flowing down to the Chrouy Snao river. At some point, villagers of Chheu Khmau commune want to be able to pump water from the Chrouy Snao river for dry season agriculture. However, this is not feasible technically because Prek Samaki is not deep enough, but, altogether, these efforts have created tensions between the two villages.

Despite these efforts, water is unevenly distributed and benefits the farmers who have land in the northern part of the canal, close to Prek Samaki, canals 11, 12, and 13 who have been able to double their harvest per year. Without any additional water supply, the rest (most) of the area is limited to one harvest per year. Farmers who have the capacity invest in wells to pump groundwater (see the illustrations). It is expensive as it requires investment in equipment, and irrigating 1 ha of rice consumes 20 liters of fuel.

As rightly suggested by Venot and Jensen (2021), the conjunction of support for prek rehabilitation from local authorities, the Ministry of Public Work and Transport, the Ministry of Water Resources and Meteorology, as well as the personal contribution of various government figures, shows to the extent to which it works as a device in the State-making project of the Royal Government of Cambodia.



Land and agrarian development after 2012

In 2012, the three main fishing lots in the area were officially terminated as part of the fisheries reforms (see above). Given that the encroachment into the fishing lots started significantly earlier, the decision is best understood as the recognition of ground realities wherein farmers had taken control over fisheries grounds. So, logically, the agrarian expansion into the flooded forest continued unabated after the official announcement of the fishing lot release (Figure 21). Within four or five years, a significant part of the remaining area covered with natural vegetation was converted into farmland. This went well beyond canal 12.5, into land that had been considered to be Public State Land, for which local authorities were not allowed to issue a land certificate. A similar process of land encroachment took place from Chrouy Snao where land insecurity was even more pronounced as the entire village is located inside ex-fishing lots 10 and 11 and is considered to be Public State Land. Until 2020, village authorities in Chrouy Snao were not allowed to offer recognition of land in the village and to issue land certification, so agrarian expansion has been relatively risky for the farmers who have been unable to gain any security for their land tenure.

Different categories of actors are involved in these dynamics of agrarian expansion. Local well-off farmers, who have access to agricultural land inside fishing lot number 10, could afford to rent machinery and equipment to enlarge their agricultural land holdings. When the fishing lots were removed, a few households with capital and financial resources to rent out, and who had access to machinery, were able to expand their land holding, and were able to compete in the area. According to our interviews, three or four households from Trapeang Chrey were involved in substantial land expansion operations, each having an agricultural landholding of approximately 100 ha. More numerous small-scale farmers (in both Trapeang Chrey and Chrouy Snao) cleared smaller areas of the flooded forest because they could not afford to rent expensive machinery and equipment for larger-scale operations. In most cases, these farmers used this as an opportunity to sell these pieces of land to investors who were particularly active in this part of the

country (its proximity to Phnom Penh made it attractive). The sale of land is driven mainly by non-productive expenses (house renovation, purchase of motorbikes, payment of debts, etc.), and investors rarely engage in agricultural operations themselves so they rent it back to landed farmers interested in enlarging their agricultural operations. Despite the circumstances being different, a largely unequal agrarian structure whereby absentee landowners rent-out land to farmers is similar to the one observed in Kanhhot. These processes are not directly associated with irrigation but are indirectly connected because irrigation, in conjunction with the removal of the fishing lots, has intensified the agrarian push into the flooded forest.

Fisheries management after the removal of the fishing lots

After the removal of the fishing lots in 2012, three Community Fisheries totaling an area of 1,702 ha were created to allow for the protection of the flooded forest and to provide a fish sanctuary (FiA, 2021) (see Figure 21 E). Between 2012 and 2015, the system went into transition during which fishing lot owners were still involved in its management. In 2015, the Community Fisheries committee was elected (Venot, 2019). A system of rotation was put in place to allow fisher folk to access the fisheries in groups, share the fisheries efforts and harvest fish more or less equally between them. But the removal of the fishing lot has altered the condition of the fisheries. As a local respondent said:

When the fishing lot was in operation, the entire area was fenced with bamboo, and water was retained in rich and dense vegetation. Now that all these fences have been removed, the water recedes more quickly in the dry season, and the wetlands dry-out rapidly. This alters fish spawning and affects the productivity of the fisheries, even small-scale operations.

And combined with massive pressure from farmers and agricultural investors into the floodplain, the productivity of the fisheries resources has declined, and efforts to manage it are concentrated in the hands of a few specialized fishermen. The rest of the population has lost interest and moved away.

4.5 The PRASAC area in Takeo province

4.5.1 History and description of the irrigation system

The so-called PRASAC area is located in Takeo province, right at the border with Vietnam, in a region that is permanently flooded from July to November. Agriculture activities typically take place before and/or after the 'big flood', from March/April to July and then from November to February.

There are continued exchanges between Cambodia and Vietnam in this border region. In Vietnam, irrigation is in full swing for a much longer time, and the tendency has been to expand Vietnamese savoir-faire into Cambodia, through the rehabilitation of acid-sulfate soils, rental of agricultural land and mechanic equipment, rice purchase and sale, provision of improved seed varieties, and even the sale of water from the Vinh Tern canal (Figure 22).

Following Beban and Gorman, we approached the area as a hybrid socio-ecological zone (Beban and Gorman, 2017). Irrigation investment started back in the early 80s with influential public figures making personal or institutional donations for the rehabilitation of canals dug during the Khmer Rouge period (see Figure 22). The main canals, deriving water from Steung Takeo and Steung Angkor Borei, date from this period. And all subsequent investments in irrigation will add to these initial efforts, but the pioneer investors (civil servants, military chiefs, etc.) have maintained a strong influence on the development of irrigation in the entire area up until the present (see below).



Canal 98 in the PRASAC area

From 1998 to 2003, an EU program called PRASAC (Programme de Réhabilitation et d'Appui au Secteur Agricole du Cambodge) supported the rehabilitation and extension of the existing irrigation system (Figure 22). The project allowed for quick drainage after the flood which paved



the way for the expansion of the cultivated area and the shift to double cropping. Farmer Water User Communities (FWUCs) were constituted back then. Despite these efforts, however, access to water remained uneven in some areas. As land elevation required additional pumping, this created the conditions for the emergence of water sellers, a new stakeholder group that progressively gained control over water distribution in the entire area in the continuity of water delivery services provided earlier by some Vietnamese entrepreneurs.

From 2012 to 2017, the government of Australia supported the Cambodia-Australia Agricultural Value Chain Program (CAVAC) that further enlarged the irrigation system, and equipped it with a denser nested system (primary, secondary and tertiary canals). CAVAC supported the development of FWUCs in two different sections of the main canals: Plovic (5,400 ha provided irrigation for 3,300 households, in the southern part) and Bantic (3,100 ha for 2,800 households in the upper northern part) (Figure 22).

A hybrid system of water management has emerged in which the FWUC assumes the responsibility for the maintenance of the primary canal and sells water to private water sellers who, in turn, pump the water from primary into secondary and tertiary canals and further to the farmers' plots. Farmers pay for pumping services from private water sellers. Some direct pumping by farmers from the primary canal might occur but it is more the exception than the rule (Phoeurk and Venot, 2019). Since 2014, MoWRaM has provided additional support in the Northern part of the area to further excavate the existing canal



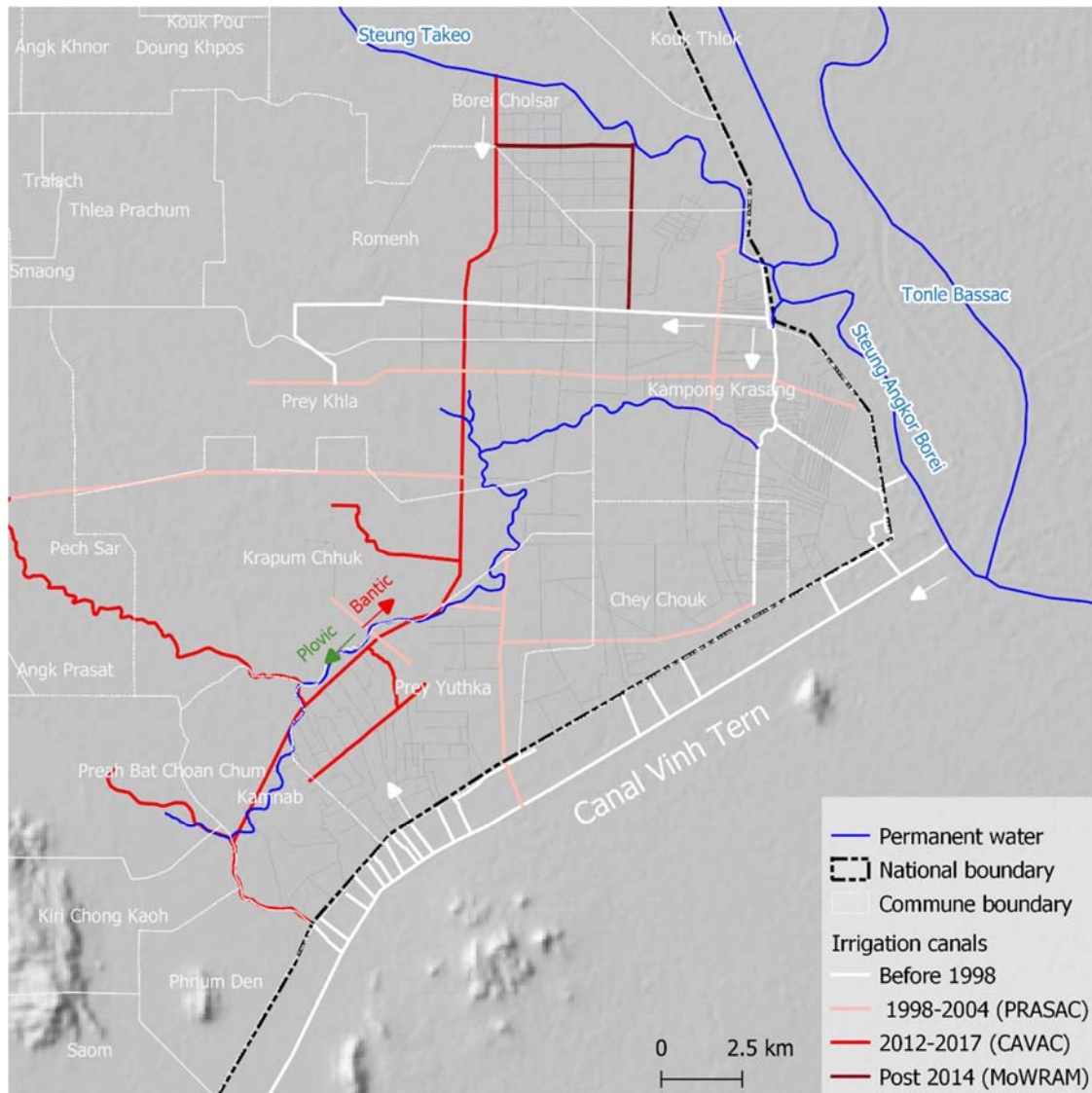


Figure 22. The irrigation systems in the PRASAC area, south of Takeo province

4.5.2 Land tenure security and expropriation

The irrigation system has been operational for a long time, and there are no outstanding cases of expropriation and compensation. Its southern part (Prey Yuktha commune, Figure 22), is located outside an ex-fishing lot and Protected Area. As such, all cultivated areas are eligible for titling.

In the northern part of the PRASAC area (Kampong Krasang and Chey Chouk communes), there are more specific land issues revolving around State land management (see below).

4.5.3 Land markets and agrarian changes

Prey Yuktha is a relatively young commune created in 1960 by the Cambodian government who initiated a pioneer movement into what was then a flooded forest. This was designed to reinforce the presence of Cambodian nationals along the border and to contain the inclination of Vietnam to control the territory (Blanchard, 1999). When the *Krom Samaki* was introduced in the early '80s after the Pol Pot regime, the farmers received 3 ha per household, irrespective of the

household size or labor force. However, the difference in agricultural landholding sizes rapidly emerged, due to the conjunction of three main factors:

1. **The date of arrival:** the rule ‘first-come, first-served’ put the families who could re-install themselves quickly in the village at an advantage after the Khmer Rouge left because they could appropriate agricultural land in the best locations
2. **Labor force:** families with relatively greater labor force capacity could acquire land by clearance outside the *Krom Samaki* area
3. **With the possession of cattle,** some families who fled to Vietnam during the Khmer Rouge time, brought back some cattle, while other families who had savings could purchase them on arrival. Families with cattle were in a better position to clear land outside the *Krom Samaki* area.

Given that the date of arrival, the labor force, and the possession of cattle were quite different between households, the agricultural expansion outside the *Krom Samaki* resulted very quickly in important differences in terms of agricultural landholding size and quality. By the mid-eighties, some families were limited to 3 ha received from the *Krom Samaki* while others had up to 10-15 ha (Fetiveau, 2019). After the dissolution of the *Krom Samaki* in 1983, a large area of the commune was still forested and the dynamic of expansion continued, propelled by the access to services supported by the government via tractor rental services (clearance of natural vegetation, ploughing, and so on). This accelerated the process (Figure 23).

During the nineties, farmers with large landholdings and surplus rice started to develop livestock and pig production activities that created the conditions for the second wave of accumulation. Based on successful livestock activities, some families could buy a second-hand tractor from Vietnam and start businesses as agricultural service providers. Others could invest in water pumps and become private water sellers (see above). These two groups were very responsive to all innovations coming from Vietnam and were the first to test and promote short-cycle rice varieties and double-rice harvests with complementary pumping. They were also in a position to buy up land from households who were unable to cope with the agronomic and economic risks associated with the intensification of rice production (Fetiveau, 2019). A process of land concentration was in motion (Figure 23).

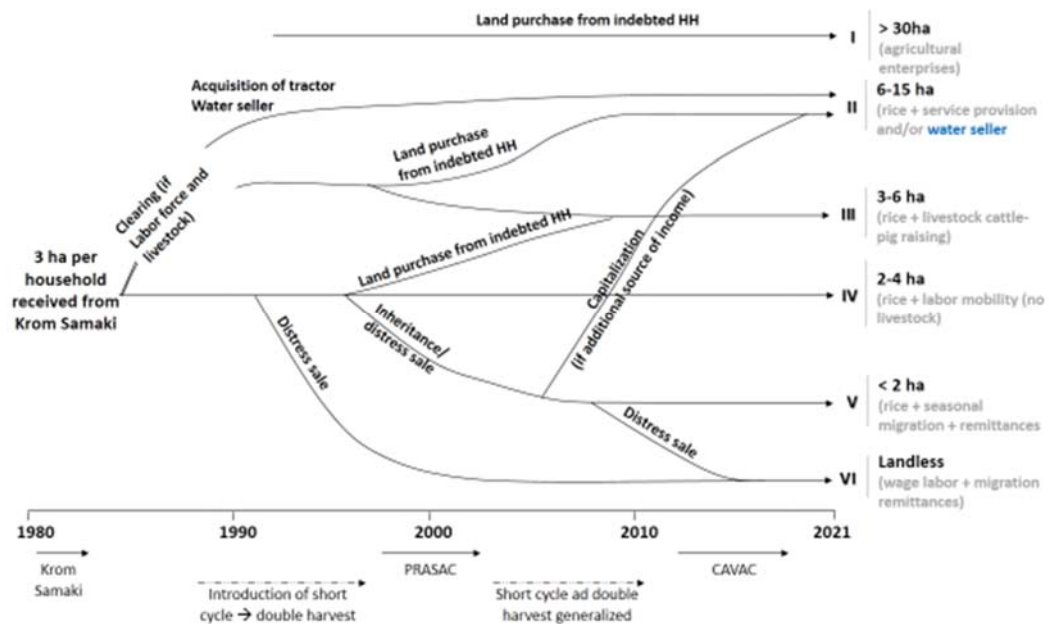


Figure 23. Trajectories of families and differentiation of farming/activity systems in Prey Yuktha commune (adopted and simplified from Fetiveau (2019)).

The PRASAC project helped to improve access to water for more farmers, but it was also instrumental in advancing rice intensification (diffusion of rice short-cycle varieties and double harvest). And, combined with the rise of indebtedness and unsuccessful risk management, the process of land concentration, described earlier, was on the rise: vulnerable households were constrained to sell their land (distress sales) to well-off farmers (agricultural service providers and private water sellers) who accumulated land. The importance of Private Water Sellers in this process grew not only because water availability increased but also because PRASAC institutionalized their role in FWUC management.

From 2000 to 2010, these processes continue unabated (Figure 23). The uptake of credit for productive and unproductive consumption became a rule and a structuring element in the livelihoods of the entire Prey Yuktha population. When the CAVAC project came in, these processes were in full swing, and the consequences in terms of the land-labor regime were tremendous. As shown in Figure 24, the incidence of agricultural landlessness increased from 5 to 11 percent between 2011 and 2019. The number of families with small agricultural landholdings (smaller than 1 ha of rice) decreased which signals that land accumulation was well advanced. In parallel, the movement of labor migration inside and outside of Cambodia increased significantly from 5-8 percent of the total active population in 2011 to more than 20 percent in 2019 (Figure 24). This was a result of the combined effects of land concentration and the advance of mechanization that reduced the need for manual labor.

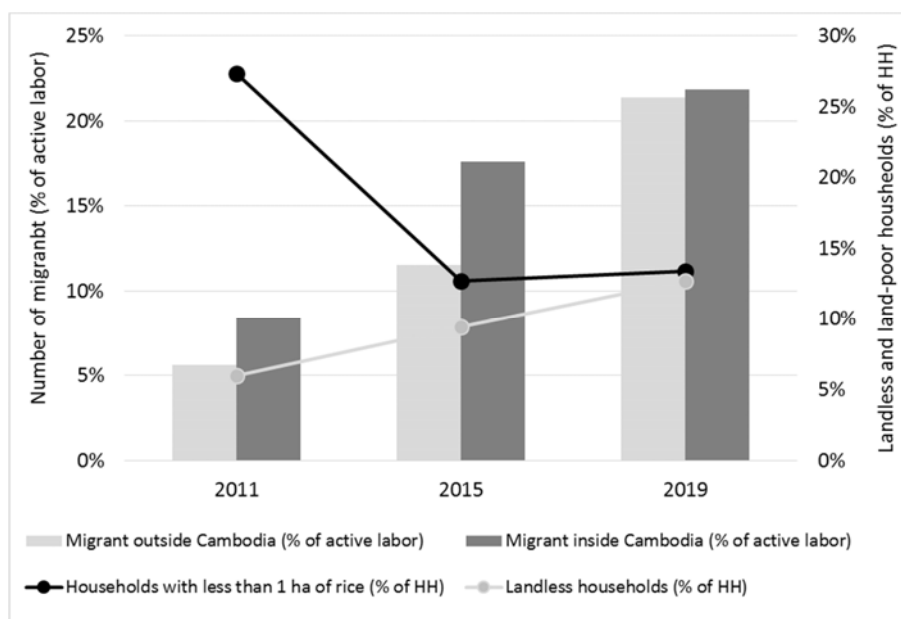


Figure 24. Evolution of agricultural landlessness and job migration in Prey Yuktha (2011-2019). Source: CDB

Similar to the process of socio-economic differentiation we observed in Kanghot (Battambang province), the access to and control of water is an element that reinforces the polarization of land and asset accumulation on the one hand, and wage labor and labor mobility on the other. However, contrary to our observations in Battambang, the process is in-built within communities without the intervention of external absentee landlords who buy up the land of indebted households and then rent it back to them.

4.5.4 Multi-functional management of wetlands

In the northern part of the PRASAC area, the development of the irrigation system encountered conflict with the management of post-fishing lot resources, including conservation efforts around Boeung Prek Lpeuv (Figure 25). This Protected Area is recognized as one of the largest remaining remnants of seasonally-inundated wet grassland in the Lower Mekong and is important for birds, plants, and other wildlife (Critical Ecosystem Partnership Fund 2019). It is one of 40 globally Important Bird Areas (IBAs) identified as key sites for conservation in Cambodia and one of three sarus crane (*Grus antigone*) conservation areas (IUCN, n.d.). In this section, we propose a quick contextualization and overview of the conflict to highlight the lack of coordination between all stakeholders in development and conservation efforts in the area.

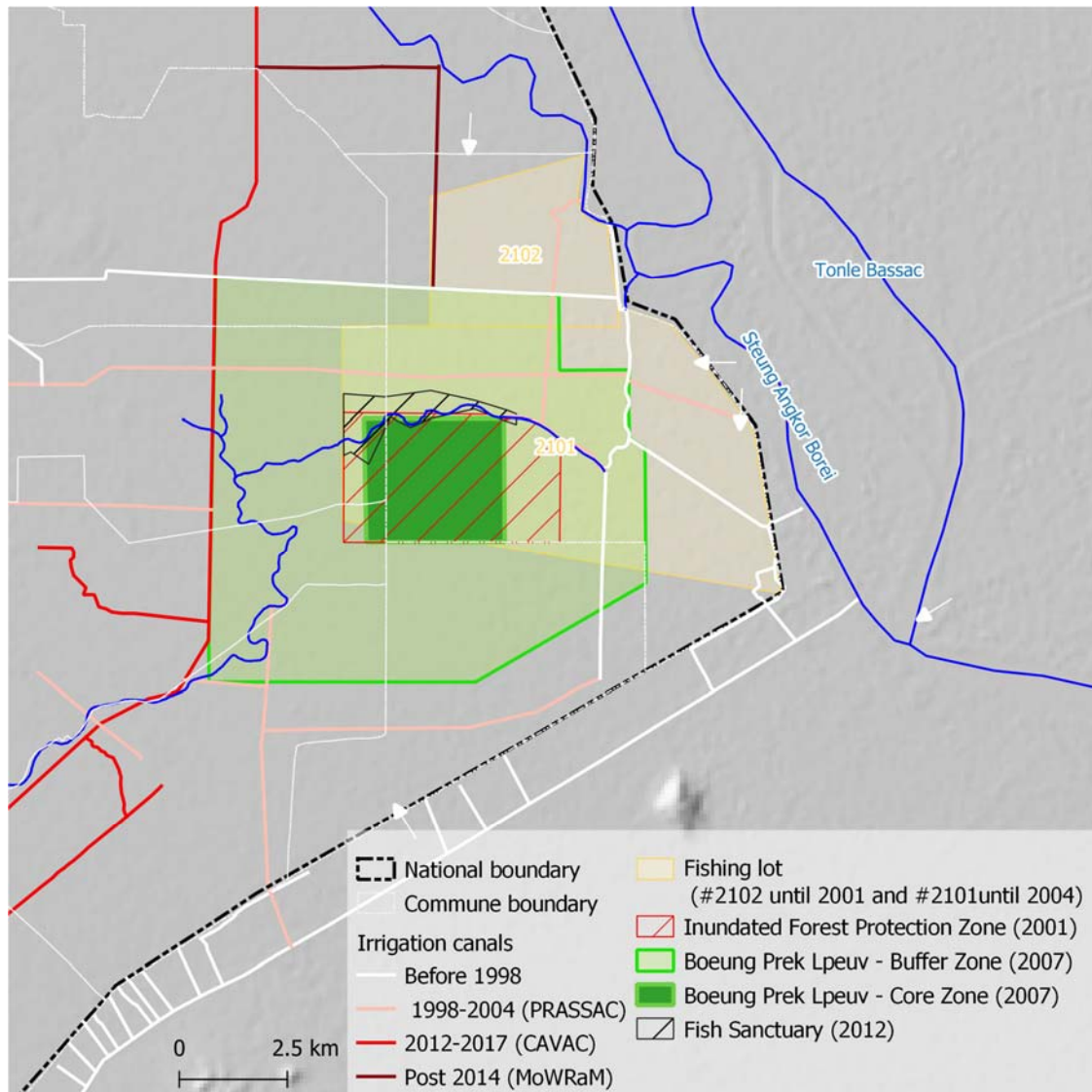


Figure 25. Irrigation and nature conservation efforts in and around the Boeung Prek Lpeuv area
 Note: Fishing lot number might not be the official number
 Source: CEPF, MoE and FIA

In 2001, fishing lot #2102 was abolished as part of the first wave of reforms. The area released from the fishing lot was made available to local communities to create a Community Fishery. At that particular time, the PRASAC project was in full swing. But engaging in sustainable fisheries management did not receive much traction in the context of massive pressure for agrarian expansion and rice intensification. Instead, an Inundated Forest Protection Zone of 1,500 ha was created to protect the remaining wetland recognized for its milieu and its potential for bird conservation, and as an important fish spawning ground (Figure 25).

Fishing lot #2101 remained operational until 2004, although it was completely canceled only in 2012 during the deep fisheries reform. At that time (2012), a fish sanctuary, partly overlapping with the Inundated Forest Protection Zone, was created as an additional protection effort for the fisheries resources that remained central to the livelihoods of the poorest segment of the local population. There were some attempts to create a Community Fishery but they were not successful.

In 2007, the Protected Area of Boeung Prek Lpeuv became a Protected Landscape Area, one type of Protected Area recognized by the Ministry of Environment. It consists of a core Zone (919 ha) designated for full protection, and a buffer Zone (8,305 ha). As shown in Figure 26, left, the core Zone has remained relatively protected from encroachment up until today, but the buffer Zone has been completely converted into farming villages and intensive rice cultivation. For the most part, there were signs of rice cultivation inside the buffer Zone as early 2007 - when the Protected Area was created. And, by 2020, the entire buffer Zone had been converted into a farming village, and an area of rehabilitated irrigation infrastructure, and intensive rice production (see Figure 26 below).

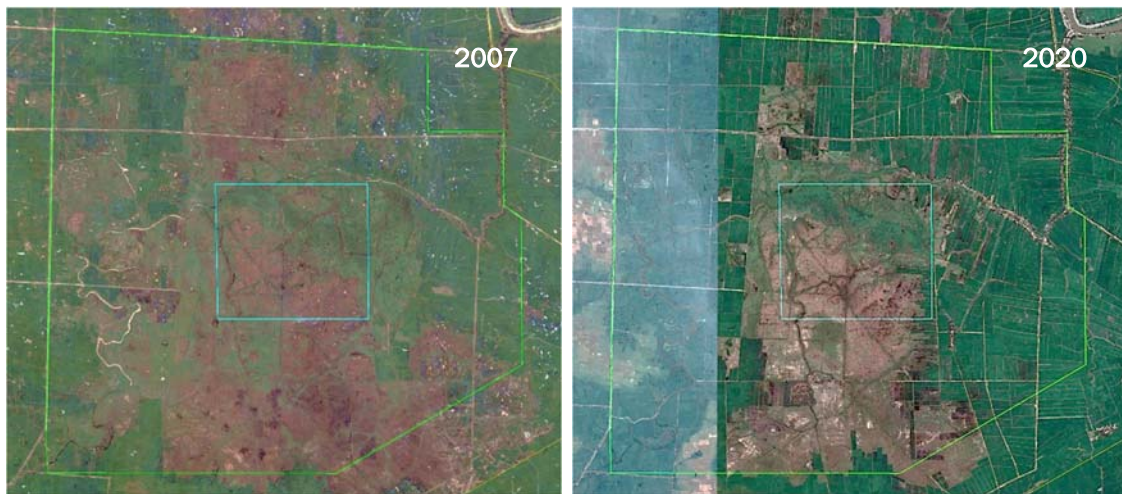


Figure 26. Google Earth view of Boeung Prek Lpeuv in 2007 (creation year) and in 2020

Note: outside the green frame is the limit of the Protected Area. The inner blue square indicates the Core zone

The historical development of irrigation and agricultural pioneering into the flooded forest is clearly at odds with more recent nature conservation efforts. A local authority representative in Chey Chouk commune summed it up in clear terms:

The increase in land price shows that everything is going in the direction of agricultural development, including inside the Protected Area. In 2002, the land was worth USD2-3,000/ha and USD5,000/ha in 2012. Now (in 2021), after all these investments in irrigation and the work of Mao Ka (the private water seller), one hectare of land costs USD15,000/ha. It is very difficult to stop the market, even inside the Protected Area....

Farmers cultivate dry season rice and pump water from streams to irrigate their paddy fields. This is combined with the less intense and shorter annual flood that has been observed over the last few years. The ecological conditions of the wetland have changed, putting animals foraging for food during the dry season at risk and threatening the ecosystem functions of the wetlands (Critical Ecosystem Partnership Fund, 2019; IUCN, n.d.). The Ministry of Environment in an alliance with conservation groups has warned that it will take legal action against those who illegally occupy land in the Boeung Prek Lpeuv Protected Landscape Area.

Up until recently, there have been very few successful efforts to bring all stakeholders together to come to an agreement on the direction that should be taken and to coordinate efforts to address the trade-offs between the development of irrigation, and nature conservation. The power configuration of stakeholders is not conducive to such a dialogue. The influence of private investors on local politics (Khouth, 2018), the economic power gained by large landowners, and the vulnerability of small-scale farmers do not create conditions for sustainable agricultural and natural resources management.

According to the representatives from PDoWRaM and the local authorities we met, the mechanism mobilized to address the conflicts and illegal occupation of State land delineated as Protected Area is Circular 02 - on measures against the illegal holding of State land - that aims to address each infringement on a case-by-case basis, along with cumbersome and time-consuming procedures.

4.6 O'Prang in Mondul Kiri province

4.6.1 Description of the irrigation system and the surrounding landscapes

O'Prang is a small irrigation system located in Kaoh Nheaek district, Mondul Kiri province. It consists of a 1,078 ha command area. The entire command area works for rainy season production, including 300 ha for dry season production (double harvest). The irrigation system provides water for the population of two villages - Chhul and Srae Huy - where we conducted the survey (Figure 27).

The irrigation system was initially built by the Khmer Rouge in 1977, while the entire Mondul Kiri population was forcibly removed to Kaoh Nheaek district to provide labor for rice cultivation and development efforts. The presence of the Khmer Rouge in Koah Nheaek significantly disturbed the culture and livelihood of ethnic people living in Koah Nheaek (mainly Bunong, but also Lao and Kroeung) (Marazzi and Phak, 2016). It contributed to their marginalization and created openings for exploitation, leading to the further demise of the highlander identity (Padwe, 2020).

From 1980 to 1992, there were some severe security concerns in the forest area surrounding and the village and local groups did not move out. Back then, there were 100 households, most of whom were ethnic minority groups (only two Khmer families). People reengaged with many diversified agricultural practices associated with shifting cultivation (rice, corn, pumpkin, cucumber, chili, etc.). The land was relatively abundant and access to resources close to the villages was not a problem

By 1992, Khmer Rouge guerrillas hidden in the forest did not represent a security threat anymore and ethnic minority groups started to go back to the places they had lived in before the Khmer Rouge period. Those who remained continued to practice shifting agriculture. In 2001, the population rose to 290 households, mainly due to the migration movement of Khmer people attracted by land.

Upland cash crops and permanent rice cultivation started to transform (again) the swidden landscapes. Even though ethnic minority groups produced rice, they did so with their techniques and know-how and without much effort to control water through the irrigation system.

In 2008, the Provincial Department of Water Resources and Meteorology started the rehabilitation of the O'Prang irrigation system under the Easter Irrigation Rural Development Project. Back then, only 30-40 households were cultivating land inside the command area as it is

today. Most of their agricultural land was outside. A majority of the families living in Srae Huy have agricultural land outside the command area and are not involved with the irrigation project.

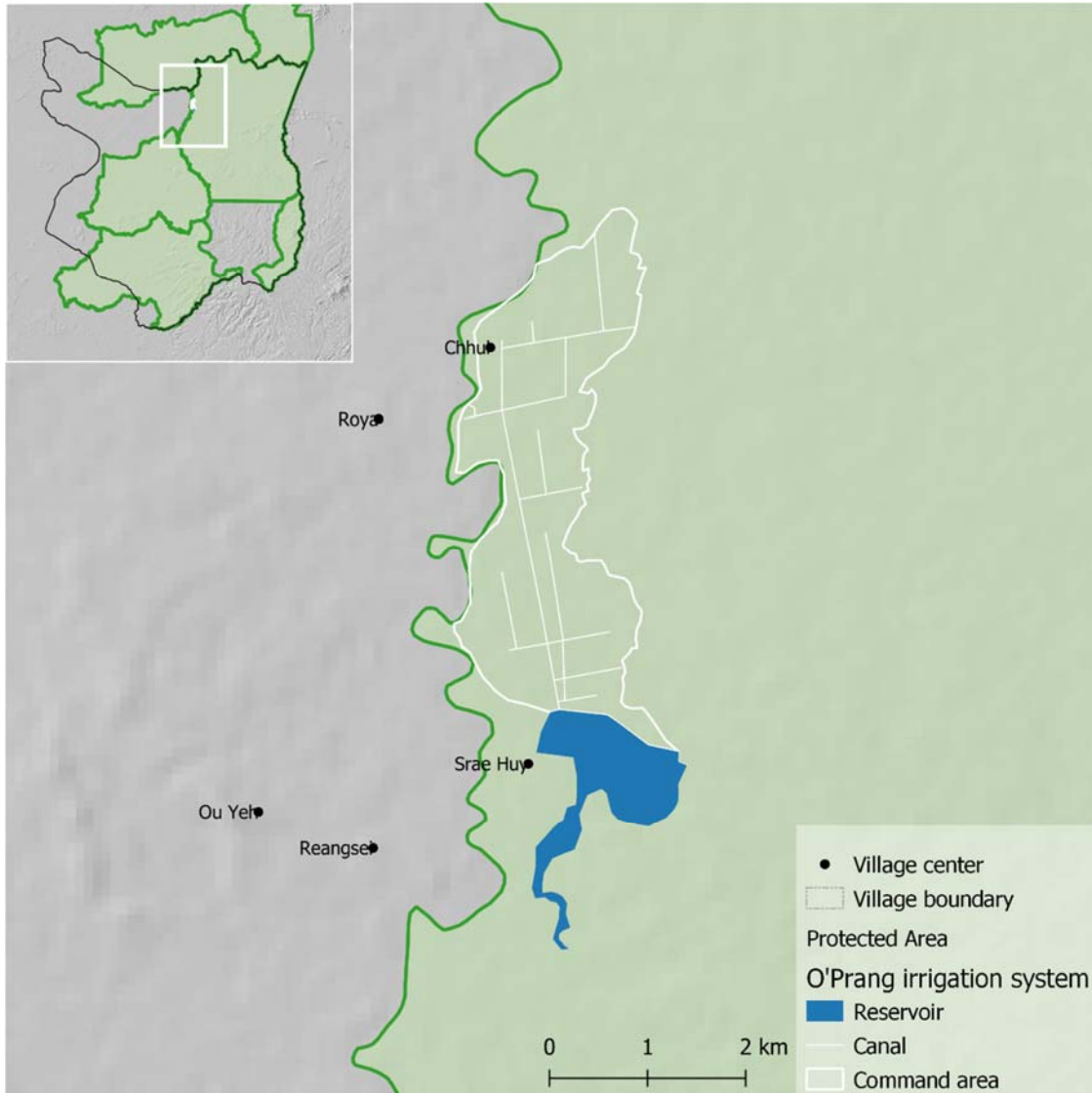


Figure 27. Location of the O Prang irrigation system in Kaoh Nheak district, Mondul Kiri province



4.6.2 Land tenure security and expropriation

Even though shifting cultivation is no longer practiced (or only at a very low intensity), indigenous peoples living in Srae Huy have plots spread across an area located east of the village, inside the Srae Pok Protected Area, a wildlife sanctuary that borders Ratanak Kiri in the North and Vietnam to the East. Srae Pok was first created in 1999 as a protection forest managed by the Forestry Administration under MAFF. In 2016, according to sub-decree 69 (Royal Government of Cambodia, 2016b), it was transferred to the Ministry of Environment to be managed as a Wildlife Sanctuary as part of the Protected Area system (Royal Government of Cambodia, 2008). It comprises a total area of 372,971 ha, about 26 percent of the total provincial area (Provincial Committee for Land Management and Urban Planning (PCLMUP) of Mondul Kiri province, 2021).

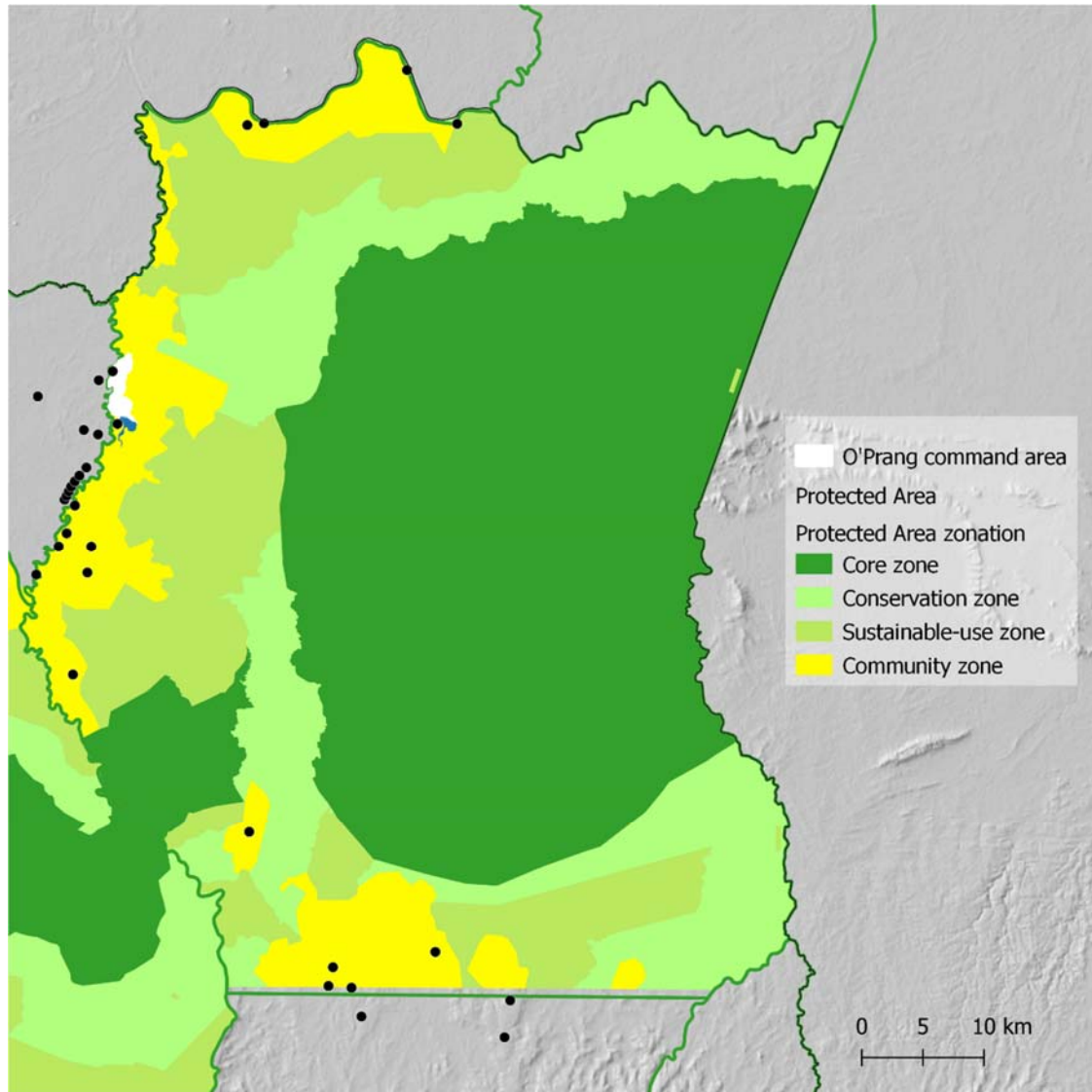


Figure 28. The zonation of the Srae Pok wildlife sanctuary in Mondul Kiri province

Environmental management conservation efforts intensified when the zonation of the Protected Area was undertaken between 2017 and 2019 by the Ministry of Environment with the support of the WWF. The zonation foresees the division of the PA into four zones: Core Zone (187,631 ha), Conservation Zone (75,631 ha), Sustainable Use Zone (65,717 ha), and Community Zone (43,992 ha) (Figure 28).

Seen from the perspective of the local population, the zonation has placed a significant limitation on land access for local farmers. Shifting cultivation is no longer possible because there is no space for the fallow forest. The area where communities have recognized rights (including the command area) is limited to the Community Zone, which is significantly smaller than the area used earlier for permanent and shifting cultivation, and the forest area for the collection of non-timber forest products. Our respondents in Srae Huy recalled the process with resentment but humor:

We were first introduced to the protection forest in 2004 when the forestry administration people came to convince us to join their efforts in protecting the forest. They [the forestry administration] told us that if you do not help to protect the forest, companies will take all the land and you will end up with nothing. But in reality, no companies ever came and now, with the zonation of the Protected Area, what we end up with is this 'conservation company'.

4.6.3 Land markets and agrarian changes

In 2008, the population of Sraey Huy consisted of 218 households (NIS, 2009). In 2011, the figure moved up to 275 households (1,109 people) and in 2019 the total number of households was 422, equivalent to a population of 1,687 people (NCDD, n.d.). The rapid increase in the total population figure is due to continued migration movements into Srae Huy, which started in 2000 and have accelerated since 2010. Most of the migrant households are Khmer families coming from the lowland regions of the country (Prey Veng, Kampong Cham, Svay Rieng) who are primarily interested in chamcar (non-rice) crop production.

But the efforts to rehabilitate the O'Prang irrigation system since 2008 have encouraged some households, particularly lowland migrants, to start looking at irrigation rice production: consequently, a market for land located within the command area has progressively emerged. For the most part, land sellers have been ethnic Bunong who are not directly interested in rain-fed paddy production because they can secure access to agricultural land for shifting cultivation elsewhere. In the beginning, the buyers were Khmer migrants, looking to ensure their food security, and some ethnic Bunong who wanted to accumulate land. This land market did not result in land concentration (see Figure 29) insofar as land sellers could acquire land elsewhere and because the total irrigated land area is a small part of the total agricultural area in the village (Figure 28).

The emergence of an irrigated land market was concomitant to the process of agrarian modernization, typified by the increased credit uptake, agricultural mechanization, and wage labor to reimburse debt (in large plantations in Ratanak Kiri province. And combined with the intensification of nature conservation efforts inside the Srae Pok wildlife sanctuary, shifting cultivation has not been practiced since 2012.

Even if there are relatively few differences between households concerning the size of agricultural landholding, land ownership inside the command area increasingly changes hands, indicating the emergence of a land accumulation process. The area of land where the double harvest is possible corresponds to 104 ha (out of the theoretical 300 ha). In Srae Huy, only 15 families receive water for double harvest and pay water fees to the local FWUC. Among them, five households came in 2015 to buy 70 hectares of land, equivalent to 67 percent of the total area suitable for double harvest. These households comprise Khmer migrants who either cultivate the land with their machinery or rent it out to other (seasonal) migrants coming from Svay Rieng, who live in Srae Huy only during the rice cultivation period. Even if this dynamic has little influence on the overall agrarian structure in Srae Huy village, it illustrates a trajectory of accumulation through the land market that is similar to those observed in the other study sites.

	Poor1	Poor 2	Middle	Better-off
Nb HH	10HH	60 HH	275 HH	100 HH
Agricultural land area	4	4	4	4
Rice area	4	4	4	4
Irrigated land			2	
Land inside PA	5	5	5	5
Land inside Community Zone	5	5	5	5
Access to forest resources inside Sustainable Use Zone	5	5	4	3
Agric. Equipment (Motortiller, Tractor)	1	2	4	5
Use of service	1	1	3	
Fisheries	4	4	4	3
Aquaculture			4	4
Draught animal	2	2		
Livestock cattle buffaloes	1	2	4	1
Livestock pig	1	2	3	
Land purchase			1	3
land sale	1	1	2	
Land rent-in			3	4
Land rent-out			3	2
Formal credit	1	1	4	5
Informal credit	1	1		
Wage labor in village	4	4		
Wage labor agriculture out of village	2	2		
Migration	1	1		
Self-employment	2	2	3	4

Figure 29. Wealth ranking and qualitative assessment of livelihoods in Srae Huy village. Number (and color) are proportional to the level of involvement/significance of the activity for the different groups: Key: 0 = not relevant/not involved; 1=very low; 2= low; 3= moderate to high; 5= very high

5 Key themes in irrigated land tenure: a discussion

In this section, we discuss the key themes in irrigated land tenure identified above by taking stock of the institutional analysis and the lessons learned from the case studies. The discussion provides a basis to formulate recommendations for all stakeholders involved in irrigation investment projects (from design to implementation).

5.1 Land tenure security

There is no specific legal framework for irrigated land tenure management in Cambodia, so land security in a command area is considered as any other type of land. The recognition and formalization of land tenure follow the Land Law, which instates the rule that land cultivated before the promulgation of the Land Law in 2001 is eligible for titling. In turn, farmers who have put a piece of land under cultivation after 2001 are not the rightful owner of that land. As such, they do not enjoy the protection of land tenure.

Except for AFD, land issues are not well addressed in irrigation feasibility studies. Donor guidelines do not include clear indications about how existing land rights should be identified, or secured, or what mechanisms are to be followed to recognize and formalize land rights. Addressing land issues is usually avoided or assigned to local authorities and the cadastral administration. In any case, identifying land rights, securing them, and addressing conflicts is not a legal prerequisite for developing irrigation.

In most command areas across the country, however, the land was cultivated before the promulgation of the Land Law in 2001. So even if they are not yet titled, they are legally possessed, and farmers have a land certificate (a so-called soft title) issued by local authorities. Additionally, land currently located in command areas across the country is not under acute threats (e.g., grabbing, encroachment, etc.). So the absence of a land title or land titling efforts is not a major constraint for the farmers.

However, the case studies have revealed several issues and risks when it comes to land tenure security:

- As observed in Ou Sanda, Trapeang Chrey, and Prasac areas, the development of irrigation incentivizes the expansion of the agricultural area into State land, which is not eligible for titling and where the land tenure of farmers might be at risk.
- At the local level, it is common practice for village or commune authorities to issue land certificates (soft titles) on State land in contradiction to the institutions of the 2001 Land Law. It creates tensions with the cadastral administration (e.g., Ou Sanda). And when the systematic land titling proceeds, the land of some households is left untitled, because the cadastral administration will not title land put under cultivation after 2001, even if the farmers have a local land certificate.
- In some cases (e.g., Trapeang Chrey) well-off farmers or land investors with appropriate connections might be able to acquire a title for their land even if it belongs to the State domain according to the Land Law. Corruption and rent-seeking are common practices and result in exclusionary outcomes for smallholder farmers.

5.2 Land expropriation and environmental impact assessment

The State is the only entity that can expropriate in the public interest, so the State takes a leading role in the expropriation and compensation procedures revolving around irrigation projects. These laws and procedures reassert that the State is the ultimate owner of the land in Cambodia and that farmers are only compensated if they are rightful land owners according to the Land Law. In other words, owners who lack formalized recognition of their land occupancy or live on State property are excluded from the procedures.

In Cambodia, it is risky for farmers to challenge the authority of the State and question State decisions, including during an expropriation process. When the construction or rehabilitation of main canals incurs a process of land expropriation, the application of the *ad hoc* procedure does

not lead to major protests by farmers. As for the construction-rehabilitation of secondary or tertiary canals, land loss by farmers is often considered an in-kind contribution, which is legitimate for the farmers.

The institutional analysis and the fieldwork conducted for this research project help identify additional issues that illustrate how expropriation procedures are mobilized on the ground:

- Problems arise when the expropriation concerns common-pool resources that are not effectively possessed individually (such as cultivated land), but are used collectively by a group under customary management. Common pool resources are not accounted for in the compensation schemes
- The Sub-decree #98 on River Basin Management (Royal Government of Cambodia, 2015a) inventories several water bodies (lakes, rivers, canals, etc.), which are deemed State land. During fieldwork, the expropriation committee identifies these areas based on a 2001 land use map and marks them as State land. When these lands are occupied, farmers are not compensated. Our case studies have shown how such a procedure acts as a mechanism of exclusion for some farmers.

5.3 Land market and agrarian changes

Irrigation triggers the intensification of rice production. It requires higher expenditure to cover expenses like seeds, fertilizers, phytosanitary products, and the rental of mechanized services (plowing, leveling, etc.). These costs are usually financed through credit, while repayment depends on the yield and production that farmers can secure. Access to credit is not a problem in Cambodia. The offers are plethoric, and soft titles (land certificates signed by local authorities) suffice as collateral to access credit at Micro-Finance Institutes. On the other hand, indebtedness, the non-productive use of credit, and the risks of crop failure due to weather variability and unreliable water supply have made livelihoods more vulnerable to economic and climate stress. Furthermore, if they are in default of payment, farmers are usually constrained to sell their land. The process results in the polarization of land and agricultural assets on the one hand, and wage labor and job migration on the other. The case studies have shown that this mechanism of socio-economic differentiation is not primarily driven by irrigation but rather by the rapid modernization of agricultural production geared toward export. However, irrigation reinforces these dynamics and exacerbates their outcome.

Land concentration proceeds through two distinct mechanisms. The first is built within communities and sees the emergence of a class of well-off farmers with large agricultural landholdings. The second is driven by land investors who are not part of farming communities and are not involved in agricultural production (rice millers, urban investors, civil servants, etc.). These new actors rent the land out to farmers (often to the farmers who sold it to them in the first place). Land concentration has two distinct outcomes. First, an important class of wage laborers deprived of their agricultural land resources emerges and has recourse to seasonal-permanent job migration (local demand for local wage labor declines due to advances in mechanization). Second, a new agrarian structure emerges whereby absentee landlords have become new land owners, and peasant farmers lease agricultural land to cultivate it. In both cases, the development of irrigation contributes to the transformation of land ownership structures that run in the opposite direction of a pathway that would support the development of inclusive pro-smallholder irrigation.

5.4 Multi-functional management of wetlands

In wetland areas, irrigation brings about a series of issues relating to agriculture, fisheries, environmental conservation, and the coordination between public sectors that govern these activities.

Between 2000 and 2012, efforts to boost irrigation in Cambodia went in tandem with the progressive demise of the fishing lots system. In areas released from fishing lots, the Fisheries Administration established Community Fisheries. But the transfer of roles and responsibilities to local communities was incomplete and has not enabled Community Fisheries management to

become a credible alternative to fishing lots for sustainable fisheries management. In addition to Community Fisheries, the fisheries administration has also established protection zones (e.g., flooded forest zonation around the Tonle Sap) and fish sanctuaries, some of which have been transferred to the Ministry of Environment as part of the Protected Areas system.

While all these efforts are aimed at sustainable management of natural resources in wetlands, they are poorly coordinated with the massive investments and stakeholders involved in irrigation development. The conjunction of fishing lots withdrawal and irrigation development incentivized a process of agricultural expansion into wetlands areas across the country, as observed in Ou Sanda, the Prasac area, and Trapeang Chrey/Chrouy Snao. Once in motion, these dynamics were difficult to contain because they have received considerable support from the public sector at various levels and are well aligned with the modernization policies of the government. But they are at odds with new fisheries and environmental rules endorsed by Community Fisheries and environmental conservationists. The clearance of flooded forests and drainage of recession water for dry season agriculture resulted in the rapid destruction of fish spawning grounds and encroachment into areas delineated for nature conservation. It has added pressure onto a social-ecological system that was already in a fragile state and has accelerated the collapse of capture fisheries indeed. Likewise, the push for irrigation has resulted in the expansion of agricultural areas into the State domain where smallholder farmers have no or little security of tenure.

The recent effort by the government to enforce the protection of the Tonle Sap flooded forest is a good step towards more effective wetland resource conservation. Because the process has reclaimed land from thousands of farmers and fishermen, questions remain as to how these efforts are coordinated with stakeholders involved in the agriculture, irrigation, and fisheries sectors.

6 Recommendations

Building on these key themes in irrigated land tenure, we now turn to specific recommendations to better account for land and natural resources tenure issues during the design and implementation of irrigation projects.

We propose two sets of recommendations focusing on two dimensions of an irrigation investment: the design and the integration of the infrastructure and command area into the wider territory (land use planning - LUP) and the monitoring and management of land issues during implementation.

6.1 Land use planning

To account for and address potential issues relating to land tenure management, we recommend situating the irrigation infrastructure and command area in a territorial approach via a land-use planning exercise.

Why land use planning?

Many land tenure issues presented in the report are multi-sectorial and span well beyond the irrigation infrastructure and command area. Irrigation naturally concerns water and agricultural land management but it has also a bearing on fisheries, environmental conservation, etc.. Also, irrigation reshapes agricultural dynamics inside command area but also influence – directly or indirectly – land management around the command area. Likewise, the institutions irrigation mobilizes are beyond the prerogatives of technical ministry in charge but engage other public sectors, actors from private, community-based groups, patronage networks, etc. This multiplicity of land uses and users requires coordination and attention to overlapping claims and conflicts.

Land use planning can be useful here as it contextualizes the irrigation project within the diversity of land use and land tenure in and out the command area. Land use planning is helpful in mapping out land regimes and helps to differentiate between private land (titled or eligible for titling) and State land. It is a prerequisite to ensure farmers have appropriate recognition of their land tenure and, in cases of expropriation, are adequately compensated. By anticipating the expansion of agricultural areas, driven by irrigation, land use planning helps identifies areas where the absence of formal recognition of land tenure might cause problems and find ways locally to address them. Typically this occurs if titling ineligibility affects poor families and/or land that is being effectively exploited but is located on State land.

More specifically, a land use planning exercise can help clarify the complexity of land use and land tenure (seasonal variation on a single piece of land) and help monitor land transactions accelerated by irrigation development. A lot of the issues discussed in the report go beyond MoWRAM alone. So there is a need to address and discuss these issues in a dialogue across sectors, typically at the sub-national level through the provincial and district unified administrations. Land use planning requires cross-sector dialogue that helps the institutional framework mobilized by the different sectors (agriculture, fisheries, water, and environment), the possible contradictions or conflicts between these institutions, and discussions to address contradictions.

More specifically, a land-use plan helps address trade-offs between development and conservation. Local-level land use planning helps this, based on the specific needs and constraints of the local population. Land use planning brings the actors into the future and helps anticipate the future. Questions about the impacts and influence of irrigation on fisheries (e.g., Community Fisheries management) or environmental conservation (Protected Areas, other conservation measures, and so on) are typically discussed at this level.

Who is involved, when and how?

The Royal Government of Cambodia has developed a multi-level institutional framework to conduct spatial planning in Cambodia, from the national to local (commune) level (Royal Government of Cambodia, 2011b). The most appropriate level of spatial planning for irrigation

depends on the size of the command area but is likely to be at the commune or district level. However, to better account for upstream-downstream connectivity and water flows, working at a river basin level usually makes more sense than at an administrative level. So the limit of the planning area needs a compromise between an administrative (commune-district) and a river basin level.

Land use planning requires the involvement of different sectors and territorial authorities, and the participation of the local population is crucial to ensure the plan captures their actual needs and potential. It is important to institutionalize the land use plan at ground level with local authorities and other community-based initiatives. The land-use plan calls upon several institutions and community-based organizations (Community Fisheries, agricultural cooperatives, FWUCs, etc.). Each of these community-based management committees is embedded within a specific sector but coordination is essential. The commune council (with support from the district One Window Office) is probably the most pertinent entity to play this role. However, the commune council carries a heavy work burden and needs to be supported in the coordination role.

We recommend initiating the land use planning process during the feasibility study and finalizing it when there is a green light for investment.

6.2 Monitoring and management of land transactions

The study showed that (irrigated) land tenure insecurity has less to do with the recognition and formalization of land rights inside the command area than with the dynamics of land accumulation and land loss associated with the land market and credit transactions. The same pattern of 'land accumulation versus wage labor' characterizes the cases and we see the emergence of an unequal agrarian structure whereby land is concentrated not only in the hands of well-off farmers but also in outsider investors who capitalize on distressed land sales by indebted farmers.

There is currently no mechanisms to track both these land and credit transactions. We recommend establishing a land transactions monitoring system, which is also key in the perspective of identifying the people liable to paying the irrigation service fees for sustainable Operation & Maintenance of the irrigation systems. We also recommend establishing a support service that helps local groups to monitor and accompany the uptake of micro-credit for productive and non-productive purposes as well as to provide appropriate services and advice to avoid over-indebtedness and ensure repayment. Such a support service would be mainstreamed with other extension services that local groups receive - for instance, the maintenance of infrastructure, the management of water, agricultural extension and training, etc. The support service would also work as an early warning system that issues alerts about risks of land loss and creates a socio-economic mechanism that would limit the marginalization of smallholder farmers due to rapid and unregulated agrarian modernization.

7 Conclusions

The study examines land tenure issues revolving around irrigation investment projects in Cambodia. It is based on a literature review, an analysis of the legal and policy framework on paper and in practice, and five fine-grained case studies conducted in different bio-physical environments.

We found that land tenure issues are not sufficiently accounted for during the design and implementation of irrigation investments. We argue that three main issues are particularly at stake. First, the recognition and formalization of smallholder farmers land tenure is not a key issue because most command areas are titled or eligible for titling. In contrast, in some pioneer-front, the construction of irrigation infrastructure incentivizes a dynamic of agrarian expansion into State land, where recognition of land tenure is not allowed according to the institution of the Land Law. It puts smallholder farmers in a situation of tenure insecurity as they are vulnerable to evictions and might not be adequately compensated in case of expropriation. Second, a more central concern for land tenure security relates to land concentration fuelled by distress sales on the part of over-indebted farmers, squeezed by the rapid and unregulated agrarian modernization, intensified by irrigation. Third, in wetland areas, the development of irrigation is poorly coordinated with fisheries and environmental protection efforts. And, given the policy and political-economic context favoring the increase of agricultural production, irrigation reinforces the collapse of capture fisheries and the encroachment into nature conservation areas. It particularly affects the most vulnerable households who depend on these resources for their livelihoods.

From the perspective of an agricultural development pathway inclusive of smallholder farmers, these issues need to be considered. We argue for land-use planning that helps address the development/conservation trade-off by situating irrigation investments in a wider territorial perspective. We also recommend establishing a service that monitors land and credit transactions and offers support to limit the marginalization of the most vulnerable farmers.

The realization of these initiatives does not necessitate revision of the legal framework and new policy instruments. It rather requires a commitment and mutual accountability of all stakeholders involved towards more inclusive irrigation investments. A challenge for the public sector is to create institutions that enable this dialogue.

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9 Annexes

9.1 Geospatial dataset

Aruna Technology (2014), Rivers and water bodies in Cambodia. Geospatial data.

CISIS (2017). Location of irrigation headwork in Cambodia. Geospatial data.

Fisheries Administration (2014). Area of fishing lots and Community Fisheries in Cambodia. Geospatial data

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Tonle Sap Zone 3: shapefile generated from Sub-decree 2011

Royal Government of Cambodia. (2011c). Sub-decree No.197 on boundary establishment of flooded forest site surrounding Tonle Sap lake in 6 provinces, with total land area of 647, 406. Phnom Penh: Royal Government of Cambodia.

9.2 List of interviewees for Key Informants Interview

Ryutaro Takaku	ADB headquarter (South-East Asia department)
TE Bunna	MLMUPC (cadastral administration)
LONG Piseth	ADB Senior project officer in charge of irrigation water at ADB Cambodia
CHHUN Sophal	ex-MoE (Department of Environmental Impact Assessment)
LY Vuthy	Fisheries Administration (Office of Community Fisheries management)
KONG Rada	CIRAD (M&E focal point for Asset project)
MUONG Sideth	AFD

9.3 Question guidelines for Key Informants Interview

Introduction

- Brief explanation about the survey and interview objectives
- Short self-introduction by the interviewee (background, experiences in the irrigation sector)

Intervention in the irrigation sector [to donors and irrigation project proponents]

- What type of irrigation systems do you support?
 - Rehabilitation - New systems?
 - Location (agro-eco systems)
- What type of support do you provide
 - Direct or indirect via third parties
 - Institutional: e.g., law/policy-making
 - Technical: e.g., design-engineering-supervision
 - Social: e.g., water management
 - Financial: e.g., support the investment
- Do you coordinate your interventions with MoWRaM? How?
- Do you use any particular guidelines to conduct the feasibility study? Your own organization due diligence guidelines? Other reference guidelines such as Environmental – Social safeguards? State law and policy?

Expropriation, compensation and relocation

- What process do you follow when the irrigation project results in expropriation? Your own procedures?
- If so, how do you align with the procedure foreseen in the Law of Expropriation?
- Do you conduct a survey to identify the existing rights to land that needs to be expropriated? How?
- What are the criteria used? Formal, informal? How do you reconcile these different criteria?
- How do you deal with situations where people occupy land classified as State land (land that is untitled and without written proof of possession)?
- In cases of expropriation, how do you take into account the livelihood values of common pool resources?
- How do you evaluate the value of land that need to be expropriated? Guidelines? Problems faced? Solutions?
- In case of relocation, how do you decide upon the relocation site? Problems faced? Solutions?

Land tenure security and land frontiers

- Is land security in the command areas a point of concern to your/your organization? Why?
- Are you involved directly in land securitization in the irrigation project you support? How?
- If not, do you coordinate this work with MLMUPC?
- Do you use specific titling guidelines?
- How do you deal with recognition and formalization of land rights in a command area when the land is classified as State land?
- How do you deal with recognition and formalization of land rights when irrigation incentivizes the expansion of agricultural land on supposedly State land?

Land markets in command area

- Do you observe an intensification of a land market before or during construction/rehabilitation of irrigation systems?
- Do you monitor it? How?
- How do you deal with speculative purchase of land by wealthy households or outsiders?
- Have you observed a process of land accumulation by some wealthy HH as a result of irrigation? Do you monitor this? How?
- Do you record land transactions taking place inside a command area? Do you do this in conjunction with the cadastral administration?
- Do you monitor the use of land as collateral for the uptake of micro-credit? How?

Environmental Impact Assessment

- Update on EIA in Cambodia (*question to EIA focal person at MoE*)
 - Status?
 - Law? Code? Technical guidelines?
 - Companies registered?
- Do you conduct an EIA during the feasibility study of an irrigation system?
- What are the guidelines used for this?
- If you use a specific guideline, how do you coordinate this with the MoE?
- Who signs off the EIA report?
- What are the issues you examine during the EIA (environmental, social, and in particular, land issues)? And what are the redlines?

- When an irrigation project is supported by a donor organization who has its own due diligence guidelines and EIA, how do you coordinate the study with the MoE?
- Are there any problems in coordination? How do you go about it?

Multi-functionality of wetlands (fisheries)

- Status of Community Fisheries in Cambodia (question to CFi focal person at the Fisheries Administration)
- What are the procedures to identify and register land included in a CFi area? Who signs it off? Do you do this in conjunction with the State Land management Committee? With MLMUPC?
- Is agricultural and irrigation management part of CFi regulations?
- If so, how is it integrated with fishing rules and regulations?
- If not, do you think it would be useful to have a more detailed land use plan for CFi management?
- What are the issues faced by CFi management groups with regard to irrigation and agrarian expansion? How do you deal with them?
- Has aquaculture had an impact on CFi management? What are these impacts?

9.4 List of interviews during field work

Date	Activity	Place	No. Participants	Type of interview
August 23, 2021	Meeting PDoWRaM	Battambang	1	Institutional questionnaire + site selection
August 24, 2021	Meeting at PDA	Battambang	2	Focus on Wat4Cam + site selection
August 24, 2021	Interview with FWUC deputy chief Canal 2-3	Wat Kandal / Kampong Kau	1	
August 24, 2021	Meeting with French students	Battambang	2	
August 25, 2021	Focus Group Discussion	Wat Kandal / Kampong Kau	7	FGD
August 25, 2021	Interview FWUC deputy chief Canal 2-3	Reang Kraol	6	Institutional questionnaire
August 26, 2021	Focus Group Discussion	Reang Kraol	10	FGD
August 27, 2022	Focus Group Discussion	Andoung Trach	5	Institutional questionnaire + FGD
August 27, 2022	Interview with FWUC Chief	Kokoh Kambot	2	Institutional questionnaire
Total Battambang			36	
September 06, 2021	Meeting at PDoWRaM	Kandal	3	Institutional questionnaire
September 06, 2021	Meeting at Leuk Daek commune	Commune hall	2	Institutional questionnaire
September 06, 2021	Meeting at Thmei village	Village chief house	2	Introduction to village meeting
September 07, 2021	FGD at Thmei village	Village Sala	5	FGD
September 07, 2021	Meeting with Dy village chief of Trapeang chrey	Trapeang Chrey	3	Introduction to village meeting + mapping
September 08, 2021	Meeting FiA Kandal (chief sangkat)	Ta Khmau	1	FiA perspectives on irrigation and agrarian expansion
September 08, 2021	FGD Trapeang Chrey	Trapeang Chrey	5	FGD
Total Kandal			21	
September 08, 2021	Meeting PDoWRaM	Takeo	3	Institutional questionnaire
September 09, 2021	FWUC	Bantic	4	FGD

September 09, 2021	Commune council	Cheuk Chok	7	Institutional questionnaire
September 09, 2021	FWUC + commune chief	Ti Hien + Prey Yukta	4	FGD
Total Takeo			18	
February 22, 2022	Meeting PDoWRaM	Saen Monourom	5	Institutional questionnaire
February 22, 2022	Meeting PDoE	Saen Monourom	1	Institutional questionnaire
February 22, 2022	Meeting Commune Srae Huy	Srae Huy, Koh Nheak	7	
February 23, 2022	FGD in Srae Huy village	Srae Huy, Koh Nheak	5	FGD
February 23, 2022	FWUC interview	Srae Huy, Koh Nheak	1	In-depth interview
Total Mondul Kiri			19	
Grand Total			94	

9.5 Quick overview of the legal and policy framework

Land ownership and tenure security

This body of documents includes the legal foundation for land ownership classification in Cambodia, making a clear distinction between State and private land. It also specifies the conditions under which land titles can be issued and, if not, how land possession can be regularized on State land, including inside the Protected Area system.

Text	Relevance to irrigated land tenure
Land Law (Royal Government of Cambodia, 2011a)	<ul style="list-style-type: none"> - Differentiates between private land (eligible for titling) and State land. - Determines how legal possession that commenced before 2001 can be upgraded to ownership.
Land titling guidelines (2002+ updates)	<ul style="list-style-type: none"> - Determines procedures for adjudication, land measurements and issuance of titles.
Sub-decree on Social Land Concessions (Royal Government of Cambodia, 2003)	<ul style="list-style-type: none"> - Defines the criteria, procedures and mechanisms for granting social land concessions to landless or land-poor households, for residential use and/or farming.
Sub-decree on State Land Management (Royal Government of Cambodia, 2005)	<ul style="list-style-type: none"> - Determines the principles, procedures, mechanisms and institutional arrangements for State land management: i) identification and mapping of State land, ii) registration and classification of State land, iii) creation and maintenance of a State Land Database, allocation and management of State land, and iv) reclassification of State land.
Circular 02 (Royal Government of Cambodia, 2007a)	<ul style="list-style-type: none"> - Provides measures against illegal holding of State land (recognition of land occupancy on State land prior to, or after rehabilitation of irrigation systems).
Law on Protected Areas (Royal Government of Cambodia, 2008)	<ul style="list-style-type: none"> - Defines the framework for the management, conservation and development of Protected Areas.

	- Identifies the possibility of establishing zonation inside Protected Areas to differentiate between areas for protection, conservation of biodiversity, sustainable use and community-based use.
Land policy (white paper) (Council for Land Policy, 2012)	- Intends to strengthen land tenure security and promote efficient land markets.
Environmental Code (Royal Government of Cambodia, 2016a)	- Provides a comprehensive framework for collaborative management in the Protected Area system, including for irrigation projects.
Due diligence guidelines of donors	- Specifies how donors and irrigation project proponents aim to address land issues and land security in the feasibility, implementation and monitoring of irrigation projects.

Water, fisheries and agriculture

This group of documents relates to the different sectors relying on water. It also places irrigation in the context of cross-sector spatial planning, emphasizing the need to strike a balance between development and sustainable land management.

Text	Relevance to irrigated land tenure
Law on Water Resources (Royal Government of Cambodia, 2007b)	<ul style="list-style-type: none"> - Determines the rights and obligations of water users, the principles of water resources management, and the participation of users and their associations in the sustainable development of water resources. - A core concept is Integrated Water Resources Management establishing links between water resources and other components of the natural environment.
Law on Fisheries, currently being revised (Royal Government of Cambodia, 2006)	<ul style="list-style-type: none"> - Regulates fisheries resource management in all fishery grounds - natural, artificial and aquaculture. - Designates fishery domains and fishing zones to support conservation and the development of sustainable fishery resources to ensure people's food security and socio-economic development.
Sub-decree on Community Fisheries (Royal Government of Cambodia, 2007c)	- Determines the rules and legislative procedures for establishing and managing Community Fisheries and the scope (rights and duties) of Community Fisheries management.
Spatial Planning Policy (Royal Government of Cambodia, 2011b)	<ul style="list-style-type: none"> - Defines key strategies and action plans for the spatial development of Cambodia in a hierarchy of planning at different levels and is the principle for cross-sector collaboration. - Proposes a mechanism to strike a balance between private land development (i.e., through irrigation) and sustainable management of natural resources.

Sub-decree on river basin management (Royal Government of Cambodia, 2015c)	- Establishes river basin management to ensure conservation, exploitation and development of water and ecological systems in an effective, sustainable and balanced manner.
Sub-decree on Farmer Water User Communities (Royal Government of Cambodia, 2015b)	- Frames the creation of water user groups to ensure the management and use of the irrigation systems in an effective and sustainable manner.
Agricultural and Water Development policy (MAFF and MoWRaM 2007) (MAFF, 2019)	- Applies a river basin approach to land and water river basins as the fundamental physical unit for management. - Suggests that water resources, irrigation and land management ought to be managed in an integrated manner at the river basin scale with a key focus on land use planning and a land allocation and tenure program.

Land expropriation and land-related impacts

These documents lay down the legal foundation that regulates the expropriation and assessment of the environment (and social) aspects of irrigation development.

Text	Relevance to irrigated land tenure
Law on Environmental Protection and Natural Resource Management (Royal Government of Cambodia, 1996)	- Provides a legal basis for the Environmental Impact Assessment sub-decree.
Sub-decree on Environmental Impact Assessment (Royal Government of Cambodia, 1999a)	- Defines procedures to conduct Environmental Impact Assessments.
Law on Expropriation (Royal Government of Cambodia, 2010)	- Defines the principles, mechanisms, and procedures of expropriation, and defines fair and just compensation for any construction, rehabilitation, and public physical infrastructure expansion projects in consideration of the public and national interest (irrigation projects are in this category).
Land Policy (white paper) (Council for Land Policy, 2012)	- Stresses the need for collaboration between MoWRaM and MLMUPC to jointly develop irrigated agricultural to support poverty reduction and adaptation to natural disasters (floods, droughts).
Due Diligence Guidelines of donors	- Specifies how donors and irrigation project proponents aim to address land issues and land security in the feasibility, implementation and monitoring of irrigation projects.
Environmental Code (Royal Government of Cambodia, 2016a)	- Provides a comprehensive framework for collaborative management in the Protected Area system, including for irrigation projects. - Instill principles of Strategic Impact Assessment at policy and/or program level.