

Implementation capacity of demonstration activities



Cambodia Climate Change Alliance (CCCA)

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Implementation capacity of demonstration activities

Working paper prepared by DHI under the
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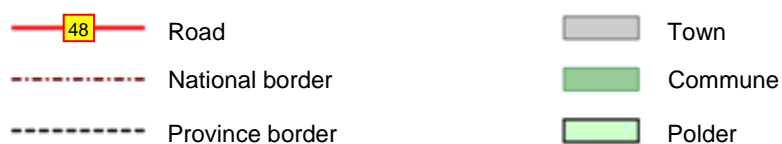
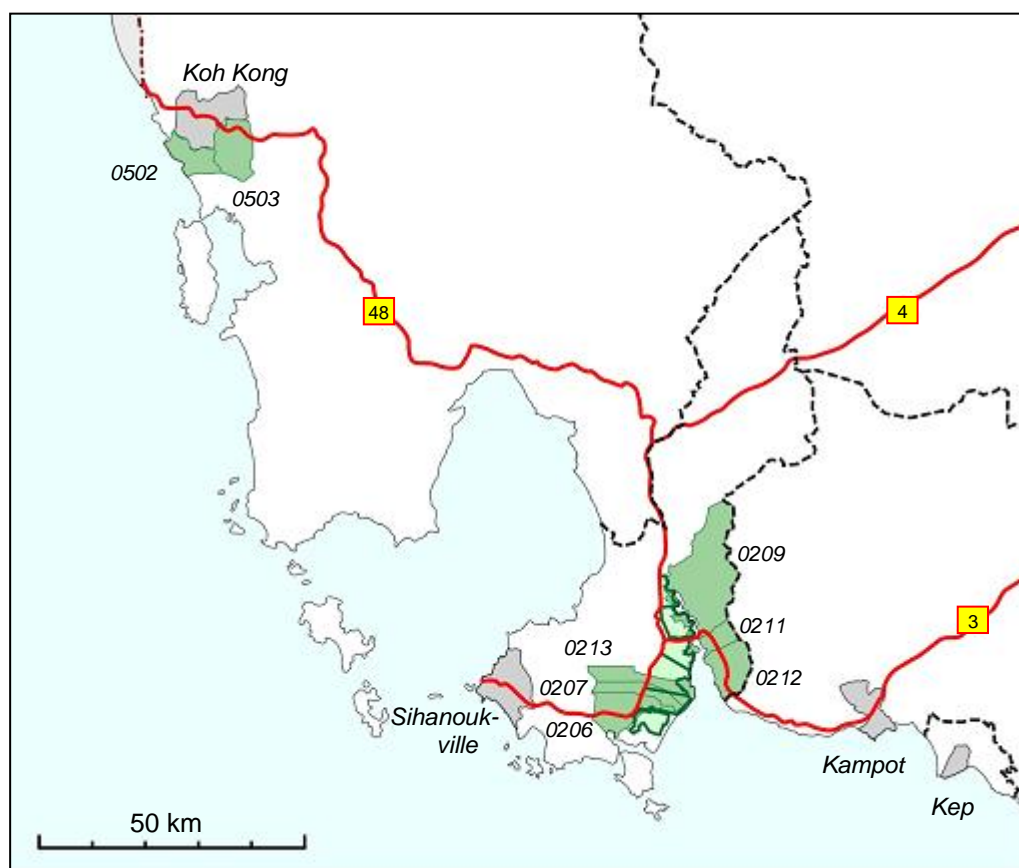
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Acronyms and abbreviations

ADPC:	Asia Disaster Preparedness Centre (in Bangkok)
AFD:	Agence Française de Développement
CARDI:	Cambodia Agricultural Research and Development Institute
CARP:	Coastal Adaptation and Resilience Planning
CBNRM:	Community-based natural resource management (a concept, and also a name of a network)
CC:	Climate change
CCCA:	Cambodia Climate Change Alliance
CCD:	Climate Change Department (of MOE)
CR:	Climate resilience
CSO:	Civil service organization
DOE:	Department of Environment
DOF:	Department of Fisheries
DOWRAM:	Department of Water Resources and Meteorology
DRR:	Disaster risk reduction
EIA:	Environmental impacts assessment
ENSO:	The El Niño Southern Oscillation (a weather phenomenon)
FFI:	Flora and Fauna International
FWUC:	Farmers water users community (water user group)
GEF:	Global Environment Facility
GIS:	Geographic information system
IDRC:	International Development Research Centre
KK:	Koh Kong
LT:	Long-term (rice variety)
MLMUPC:	Ministry of Land Management, Urban Planning and Construction
MOE:	Ministry of Environment
MOI:	Ministry of Interior
MOP:	Ministry of Planning
MOWRAM:	Ministry of Water Resources and Meteorology
MRC:	Mekong River Commission
MT:	Medium-term (rice variety)
O&M:	Operation and maintenance
PEMSEA:	Partnerships in Environmental Management for the Seas of East Asia (a GEF- UNDP regional programme)
PIP:	Public Investment Plan
SHV:	Sihanoukville
ST:	Short-term (rice variety)
UNDP:	United Nations Development Programme
VRA:	Vulnerability Reduction Assessment

Location map



Communes:	0502:	Peam Krasaob Commune, Mondol Seima District
	0503:	Tuol Kokir Commune, Mondol Seima District
	0206:	Ou Oknha Heng Commune, Prey Nob District
	0207:	Prey Nob Commune, Prey Nob District
	0209:	Sameakki Commune, Prey Nob District
	0211:	Tuek L'ak Commune, Prey Nob District
	0212:	Tuek Thla Commune, Prey Nob District
	0213:	Tuol Totueng Commune, Prey Nob District

Map compiled from different sources.

Commune codes, administrative borders and English spelling of names is from NIS (March 2012)

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A smooth formal collaboration and informal dialogue has been maintained with CCCA, sharing information, ideas and findings.

The Team sincerely thanks everyone who shared their time and knowledge, and look forward with enthusiasm and confidence to a continued fruitful dialogue.

The following persons (listed by order of alphabet) kindly shared their knowledge and provided guidance and ideas:

In Preah Sihanouk

Mr. Chea Saly, Chief of Agronomy Office, DOA; ms. Chim Kalyan, Deputy Director, DOE; mr. Chum Chanthol, Chief of Agricultural Extension Office, DOA; mr. Chun Sun Heng, Vice Chief, Tuek L'ak Commune; mr. Heng Sophornrith, Deputy Director, DOWRAM; mr. Khuy Khay, council member, Tuek L'ak Commune; mr. Ngoy Peng Chiv, Deputy Director, DORD; mr. Nos Orn, Vice Chief, Tuek Thla Commune; mr. Nu Ramy, Executive Director, Prey Nob FWUC; mr. Ork Song Horn, Deputy Director, Prey Nob District; mr. Oun Em, Officer, Prey Nob District; mr. Prack Sarim, Chief, Sameakki Commune; and mr. Yim Boy, Chief, Prey Nob FWUC.

In Koh Kong

Mr. Ben Vanna, Deputy Governor, Mondul Seima District; mr. Chey Yoen, community member, Peam Krasaob Commune; mr. Chhiv Reth, Vice Chief, Fisheries Office; mr. Chut Tit, Commune Chief and Community Chief, Peam Krasaob Commune; mr. Em Yoen, community member, Peam Krasaob Commune; mr. Ev Vanna, Deputy Director, DOWRAM; mr. Hun Marady, Deputy Director, DOE; mr. Khoem Sanith, First Vice Chief, Toul Kokir Commune; mr. Leng Chan Sokthear, Officer, Agronomy Office; mr. Moun Phala, Acting Director, DOE; ms. Neang Kun, First Vice Chief, Peam Krasaob Commune; mr. Phong Livireak, Director, DOA; mr. Prark Dina, Commune Secretary, Toul Kokir Commune; mr. Seng Bunna, Officer, Fisheries Office; mr. Siak Samoun, Vice Community Chief, Peam Krasaob Commune; mr. Som Chea, Deputy Director, DRD; mr. Soun Noun, Chief of Veterinary Office, DOA; mr. Ty Vech, Commune Secretary, Peam Krasaob Commune; and mr. Yem Yan, Vice Chief, Peam Krasaob Commune.

In Phnom Penh

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Change Department, MOE; mr. Tong Bunthoeun, Deputy Director, Department of Wetlands and Coastal Zone, MOE; mr. Touch Veasna, Soil and Water Science Office, CARDI; and mr. Ung Soeun, Senior Agricultural Officer, Agricultural Land Resource Management Department, MAFF.

Summary

This study addresses the capacity of various government bodies to implement demonstration activities under the Coastal Adaptation and Resilience Planning (CARP) component of Cambodia Climate Change Alliance (CCCA). It is based on consultations in May-August 2012 with 12 sub-national authorities in Preah Sihanouk and Koh Kong Provinces, as well as the Prey Nob Water User Community, as well as consultations in Phnom Penh with 12 national administrative bodies and organizations.

The demonstration activities have not yet been selected (as the implementation capacity is one among other considerations in this connection). They are expected to include general support to production systems and livelihoods; support to farmer, fishery and water user communities; and support directly to farmer households; with sustainable production systems and livelihoods as a common perspective.

The institutional capacity is related to the skills, tools and other resources available to an organization to implement (or support) to implement such activities. This includes:

- Staffing; human skills;
- facilities (such as computer hardware and software, transport, equipment for monitoring and analysis);
- tools: Guidelines; decision-support tools;
- availability of relevant data and information, including maps and weather data;
- financial resources: (1) for routine operation and maintenance; and (2), for implementation of development initiatives according to plans;
- networking modalities (for dialogue with other management levels and with other agencies at the same level); and
- relations with (1) the service users; (2) the private sector; and (3) other stakeholders.

The consultations indicate several capacity gaps; but also some '*low-hanging fruit*' available for visible improvement at a small cost (if any):

Data and information: Data are unavailable or difficult to access even when they exist. This means an unnecessary uncertainty (and undue opportunity costs) in connection with many marine and coastal feasibility and impact studies; as well as structural design (of dykes, roads, urban stormwater drainage, other infrastructure, and structural development initiatives).

Maps are not widely used. This is due to lack of software, hardware and human skills. A more general use of maps would support well-informed decisions, as well as inter-agency knowledge-sharing and general dissemination and awareness.

Soil management is an important challenge in a context where cultivation systems need to adapt. Furthermore, soils in the CARP pilot areas along the coast seem to be particularly poor by national standard.

There is a need of *research* in the coastal zone, for example regarding salt tolerance of rice varieties and soil classification for cultivation.

Private sector liaison and dialogue can be strengthened in many ways. In the coastal zone (like elsewhere in the country), the private sector is a vibrant and entrepreneurial driver of development. During the 2011 floods in Thailand, the private sector suffered severe impacts with national significance. There is a clear scope for involving the private sector in CR and DRR efforts.

Capacity-building activities can support the implementation of demonstration activities, while, at the same time, serve highly useful purposes in their own right.

Some suggestions are provided below, in random order. These suggestions include ones that are beyond the scope of the CARP (because of their time horizon). Still, they are retained on the list, because they may add value and contribute to dissemination and consolidation of initiatives under the CARP:

- Inter-disciplinary CC training at province and district level;
- knowledge base consolidation and expansion: Support to dissemination of existing data; guidance on improved monitoring (of rainfall, salinity, land subsidence, cultivation practices, and more); promotion of the use of maps, and better accessibility of existing maps: as well as guidance on the use of satellite data and imagery, including resources readily available from the Internet;
- capacity-building in soil quality analysis and soil management;
- a bridging programme, possibly involving exchange visits by farmers and salinity control operators with peers in the Cuu Long (Mekong) Delta in Viet Nam (where a substantial experience has been achieved within cultivation in areas exposed to sea water intrusion);
- a '*Climate Change Atlas*' for the coastal zone, including mapping of present (normal and extreme) rainfall and sea level, and flood risk;
- a national MSc-level education in environmental management (including the climate perspective);
- formation of a national professional organization in support of networking and knowledge-sharing among practitioners;
- publication of policy briefs/case studies, including success stories; and
- support to national networking about drought preparedness and drought mitigation.

1 Introduction

This paper is related to Outcome 2 of the CARP: *'Increased resilience of coastal communities and coastal ecosystem buffers to climate change and improved livelihoods'*.

Specifically, it is related to Output 2.1:

'Assessment of implementation capacity of demonstration activities'.

The work included a series of consultations with sub-national government bodies in Preah Sihanouk and Koh Kong in May 2012, as detailed in Appendix C, and with national government bodies and other organizations in Phnom Penh in July and August 2012, as detailed in Appendix D.

A total of 24 ministerial departments and other organizations kindly shared their knowledge and made recommendations, as well as district and commune council representatives from Prey Nob District, Preah Sihanouk Province, and Mondol Seima District, Koh Kong Province, as listed in Appendix B.

The present revised version of the document reflects guidance and comments to a previous draft from the CCCA Secretariat.

2 Background

Demonstration sites have been selected as follows:

- Ou Oknha Heng, Prey Nob and Tuol Totueng Communes (covering parts of the Prey Nob Polder), as well as Sameakki, Tuek L'ak and Tuek Thla Communes, all in Prey Nob District, Preah Sihanouk Province; and
- Peam Krasaob Commune and Tuol Kokir Commune, Mondol Seima District, Koh Kong Province.

Large parts of these areas have low elevations above sea level and a particular vulnerability to climate change. They feature agriculture (mostly paddy cultivation); fisheries (mostly small-scale); and mangrove ecosystems.

The selection of these two provinces was endorsed by the stakeholders present at the national consultation workshop on 16 March 2010 which included stakeholders from all provinces.¹

The areas represent frontiers in Cambodia's exposure to climate change. Lessons learnt and achievements made would serve as examples for replication elsewhere in Cambodia, as well as in other countries.

3 Climate-related governance challenges

The new implications imposed by climate change interact with existing and well-known challenges related to national and sub-national socio-economic development. Institutional capacity is a cornerstone in this connection.

¹

Accordingly, capacity building and human resource development is specified as one of the four strategic '*growth rectangles*' of Cambodia's *Rectangular Strategy for Growth, Employment, Equity and Efficiency, Phase II*, presented by Prime Minister, Samdech Hun Sen, on 26 September 2008.²

One important aspect of institutional capacity is that it is manageable - as compared with the weather itself. Therefore, capacity-building is among the attractive entry points to improved climate resilience.

Capacity-building will almost always serve a range of good purposes that reach beyond the climate perspective.

In the coastal zone, as elsewhere in the country, a distinction can be made between immediate, medium-term and long-term aspects:

- Immediate concerns include public health (safe water and sanitation); livelihoods and production systems; and environmental health of coastal and marine habitats, including the mangroves.
- Medium- and long-term concerns include the smooth transition to a society that is visibly different from today's. In the future, most people will live in towns, rather than in rural areas. Agriculture will remain an important sector but will employ far less people than today, and the national economy will be supported by manufacturing, industries and the service sector - including tourism. This development is in full swing and is desirable in many ways. The challenge is a smooth transition, without excessive adverse social side effects, where a part of the population is left behind during the transition.
- Another important challenge is the continued strengthening of the national education system (from primary schools to the universities), and the consolidation of the national resource base of government officials and professional practitioners.

Good governance relies on adequate and responsive institutional capacity, and any efforts in this respect will inevitably contribute to a healthy and prosperous society.

4 Applied methodology

4.1 Overview

For the purpose of this paper, '*institutional capacity*' is taken as the skills, tools and other resources available to an organization to undertake its responsibilities in general or a specific task in particular. This includes:³

- Staffing; human skills;
- availability of relevant data and information, including maps and weather data;
- facilities (such as computer hardware and software, transport, equipment for monitoring and analysis);

² The strategy has '*good governance*' as its core priority. The other 3 growth rectangles are (1) enhancement of the agricultural sector; (2) further rehabilitation and construction of the physical infrastructure; and (3) private sector development and employment

³ Other characteristics, not included in this list, are formal mandate; informal recognition; leadership; operational and procedural modalities; and attitudes to service/ innovation

- tools: Guidelines; decision-support tools;
- financial resources: (1) for routine operation and maintenance; and (2), for implementation of development initiatives according to plans;
- networking modalities (for dialogue with other management levels and with other agencies at the same level); and
- relations with (1) the service users; (2) the private sector; and (3) other stakeholders.

The significance of these characteristics is elaborated in the following section.

4.2 Specific capacity needs

Staffing, human skills

Human skills are important, not least because the requirements are evolving under the impression of added pressures imposed by climate change. A summary of climate-related needs is provided in the following table.

Table 1: Overview of human skills requirements

Impacts	Sea water intrusion control
	Coastal erosion control
	Drainage, flood control
	Drought preparedness and mitigation
	Mangrove health
Resilience	Safe water & sanitation
	Water resources management, water efficiencies
	Rice cultivation technology, production efficiency, and related threats
	Livestock breeding, production efficiency, and related threats
	Other production systems, production efficiency, and related threats
	Soil quality and soil improvement
Knowledge base	Data management

Source: Consultations in May-August 2012

Many valuable skills development efforts have been made in the past, while others are in progress or being planned. Dialogue, and perhaps a bit of gentle coordination, could add value to the efforts at a marginal extra cost. This could include exchange of courseware, and perhaps, in due time, some sort of accreditation of the training, perhaps in collaboration with one or several universities. (Inspiration can be obtained from Singapore, where the Professional Engineers Board (PEB) operates a practical (and non-intrusive) accreditation of postgraduate vocational courses offered by a variety of service providers).⁴

Data and information

Data and information are needed for timely and appropriate decision-making.

Much of Cambodia's recent, impressive infrastructural development has taken place on a basis of less than perfect knowledge, because data do either not exist, or are not

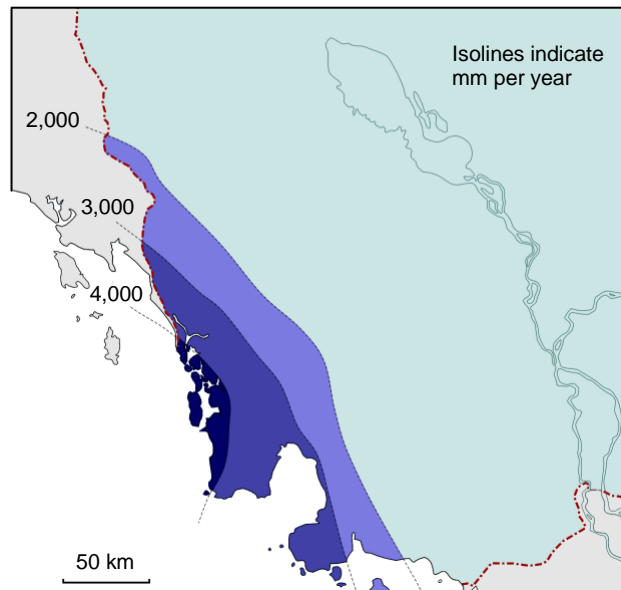
⁴

PEB was formed in 1971 as a statutory board under Ministry of National Development. For information, please refer to www.peb.gov.sg

easily accessible. A good basis for feasibility studies and design will increase the cost-benefit ratio of infrastructural developments, reduce the risks, and add to a good investment climate.

The rainfall has a pronounced seasonal variation, as well as random short-term variations. In the coastal zone, the rainfall varies significantly from one location to another. The annual average rainfall can vary by 1 m per year over distances of less than 50 km (see figure below). Often, data from one station are merely indicative for conditions at nearby locations.

Figure 1: Distribution of normal rainfall along the coast



Knowledge about normal and extreme rainfall is needed for cultivation planning; irrigation system operation; and feasibility assessment and design of irrigation and drainage infrastructure.

Some data exist, but they are fragmented and not readily accessible (for example, monthly rainfall statistics are not available from Koh Kong Province). A combination of ground monitoring and satellite data (free from the internet) would provide a much better coverage. A better dissemination will provide large benefits for a negligible cost.

Information about *monthly mean sea level, tidal heights and storm surge heights* is required for risk assessment of floods and saline intrusion, and for feasibility assessment and design of dyke heights and drainage capacity.

Data about *evaporation and sunlight radiation* are sporadic or non-existent, but would be useful in connection with selection of new and better seeds.

Land subsidence seems to be an issue in low-lying drained areas, notably the Prey Nob polders in Preah Sihanouk Province. Good quantitative evidence would highly facilitate appropriate and timely decisions, feasibility assessment and design of sea walls and drainage infrastructure.

Socio-economic data, important for development planning and progress monitoring, are available at commune level from National Institute of Statistics, Ministry of Planning.

Facilities

Facilities (for the purpose of this paper) include basic office equipment (printers, photo copiers); computer hardware and software; vehicles; cameras; and equipment for positioning, monitoring and analysis.

Today, in the coastal zone, there is a visible scope for upgrading of facilities across nearly all province- and district-level government bodies. This is due to lack of funds. Even in the frequent case that some facilities were provided in the past, they may be idle due to lack of funds for operation and maintenance.

For example, there is a broad demand of *soil analyses*. Some farmers use inorganic fertilizers today; and more will do so in the time to come, in support of new and better rice varieties, as well as crops other than rice. But the choice of fertilizer - the N-P-K mix ⁵ - depends on the contents of nutrients already available in the soil and in the water. If a less than optimal mix is applied, it may well have a certain, visible positive effect; but still, the farmer pays for unnecessary fertilizer components, and the environment will be polluted by the surplus. Knowledge about nutrients in the soil and water would support the farmers and the environment at the same time. Analyses could for example be provided by the Department of Agriculture, or by a private operator (possibly a fertilizer supplier), against a moderate fee. The farmers will quickly learn whether this is worthwhile or not.

Tools

A frequent suggestion during consultations in May 2012 was provision of *guidelines* on climate-related matters.

Guidelines can be useful in connection with (1) knowledge base development; and (2) planning:

- Monitoring and documentation of climate-related vulnerabilities and impacts, including minimalistic (and low-cost) but systematic and targeted monitoring efforts;
- screening of climate-related opportunities and risks, possibly coordinated (or integrated) with EIA screening; and
- mainstreaming of climate resilience into sub-national planning (including the commune level).

Several initiatives in this respect have been made recently, while others are planned or in progress, under MOI, MOP and MOE (and possibly others).

In the medium term, *decision-support tools* can provide a cost-effective means to strengthen analyses of impacts and feasibility, and decisions on investments and other development initiatives. This can add to the benefits (and reduce the risks) of physical and land use interventions, which are in progress or being planned across the coastal zone. Examples of analyses are environmental implications; surface runoff and drainage (including, but not limited to urban areas); and coastal erosion and accretion.

⁵

N = nitrogen, P = phosphorous, K = potassium

Applications of data, knowledge and decision-support tools

- Infrastructural feasibility studies and structural design;
- environmental impact analysis (EIA) and strategic environmental assessment (SEA);
- water quality management;
- analyses of present and future water utilization and water availability;
- operation of irrigation systems;
- salinity control;
- flood forecasting;
- drought management;
- hydropower plants and storage reservoirs (feasibility, design and operation);
- urban drainage (design and operation);
- morphological management (including bank erosion and accretion in rivers and along the coast); and
- port development, dredging and reclamation (feasibility and impacts).

This includes ***climate-related implications***, as relevant from case to case:

- Sea level rise;
- weather irregularities (storms, rain storms, dry spells); and
- changed patterns of 'normal' rainfall and temperature.

GIS tools can highly facilitate both monitoring and planning, but require expensive hardware and software, and a '*critical mass*' of embodied skills for routine application.

Such tools can, in the course of time, be implemented for in-house application by various government bodies, and/or within the private sector or universities, who can make the tools (and the embodied expertise) available on demand.

Financial resources

Financial resources are needed for basic routine operation and maintenance. Additional resources (for non-routine activities) are needed for implementation of development initiatives according to plans, and would facilitate timely response to urgent and/or obviously beneficial development needs, for example as identified at the commune level.

Financial resources are broadly inadequate in the study area.

A small step in the right direction could be made by introducing cost recovery where this is appropriate and can be done without adverse side effects. A water fee is already applied for fields served by irrigation and is intended to recover operation and maintenance costs (but not capital costs, because this would seldom be feasible). Perhaps fees could be charged for data; for EIA processing (like the fee routinely charged and broadly accepted for construction permits); for routine environmental inspections of factories and land concessions; for water abstractions (including groundwater); and for sewage disposal licences.

Networking modalities

The networking capacity is an important characteristic of a public administrative body involved in service delivery. Networking comprises

- vertical liaison with other management levels (for example between a ministry, a province department, and the communes);
- horizontal liaison with other agencies at the same level; and

- external relations with (1) the service users; (2) the private sector; (3) other stakeholders, such as CSOs; and (4) the newsmedia.

At the province level, a formalized networking is in place under the auspices of the provincial governor. For example, the provincial development plans and public investment plans are prepared with active participation by the various departments. This works well in the study area, but could presumably be further consolidated in different ways.

Also, the networking between the province level, the district level and the communes works well in many cases. This networking is important, because some development needs and opportunities are identified at the commune level, but may be better suited for implementation (and financing) at a higher level. Even if it works well, any support to consolidation would be valuable.

New EIA law

A new EIA law is in preparation by MOE. It is expected to cover management of various emissions (including greenhouse gases) as well as land use. It would be relevant to consider whether the new law could accommodate some extent of *'screening for climate resilience and disaster risk implications (threats and opportunities) where appropriate'*.

4.3 Capacity-building opportunities

The consultations conducted under the present study identified human resources as a main constraint to climate-related institutional capacity. Training is a main priority, and provision of information and guidelines is another.

Province level

The province is the main vehicle for sub-national capacity. Many provincial departments have a quite fair capacity (although somewhat affected by frequent staff rotations), and a solid knowledge about development needs and opportunities. Presently, related capacity is being developed in the provincial administrations (under the governor's office). Inter-agency collaboration works well, and relations with service users and stakeholders are close and functional. The strategic development planning has a perspective that looks beyond immediate operation and maintenance needs, but funds for implementation are inadequate.

MoE's Coastal Coordination Unit (CCU) and the province-level inter-agency working groups under the Governor's Office offer a functional platform for province-level capacity-building, which, in turn, can provide a platform for support to the communes.

Commune and community level

The communes are strong in terms of insight into socio-economic development needs and priorities, but somewhat less so when it comes to management options - particularly in case of unfamiliar challenges, such as climate change and new production technology.

The communes are staffed with one clerk each (seconded by MoI). There is no basis for comprehensive in-house capacity-building. Rather, expertise is provided on demand by the provincial line departments and by the Technical Support Units of the provincial administrations, for example in connection with the commune-level development and investment planning. Financial resources are broadly inadequate, in many cases impeding urgent operation and maintenance of roads, irrigation infrastructure and flood protection.

Hereby, access to expertise becomes a key to commune-level capacity.

Skills are urgently needed related to production systems in general and resource-based production systems in particular. This was clearly confirmed across the consultations. Farmers are aware of the need to adapt to climate change, but are unaware of the related new and unfamiliar challenges, for example when shifting from long-term to short-term crops, when preventing soil deterioration, or when implementing tree-planting schemes.

5 Suggestions on capacity-building activities

5.1 General

The suggestions made below take their starting point in needs related to the pilot activities under the CARP.

It is not possible, however, to make a sharp distinction, in terms of scope and timing, between such targeted, immediate needs and more general climate-related capacity-building, which will in many ways require a longer time horizon than accommodated by the CARP.

Under the CARP, capacity-building activities can support the implementation of demonstration activities, while, at the same time, serve highly useful purposes in their own right. Some suggestions are made below, in random order.

5.2 Province level

The province level of administration includes the ministerial departments and the province administrations with its technical support units.

Needs assessment

Immediate needs include

- technical expertise related to climate resilience of production systems and infrastructure; and
- tools (including guidelines for decision-support). (Guidelines for strategic development planning are available and are presently being upgraded to accommodate climate change).

Examples of pilot activities

Immediate and short-term capacity-building may include for example:

Thematic ***inter-agency mini-seminars*** with participation by national resource persons, for discussion of climate-related vulnerabilities, opportunities and management options.

Inter-disciplinary CC training at province and district level, aiming at identification of entry points for introducing the CR in the development planning, and promotion of sharing data and information. Some training was done in the past and was well received.

The Provincial Working Groups in the two target provinces are well placed to contribute, with their functional inter-agency networks.

5.3 Commune and community level

Needs assessment

The communes and communities are in need of

- understanding of new and unfamiliar resource-based technology, including (but not limited to) new rice varieties, soil management and tree planting schemes;
- understanding of related opportunities and management options; and
- consolidation of management of existing resource-based production systems and infrastructure.

Examples of pilot activities

Immediate and short-term capacity-building may include for example:

A ***education and awareness-building campaign***, starting with training-of-trainers at the province level, with subsequent pilot implementation in the target communes, involving commune councils and schools. Topics to be covered may include sea level rise, coastal/river mouth erosion, saline intrusion, mangrove habitats, sea grass and coral habitats, floods and storms. Courseware can be readily prepared by adaptation of a nice toolkit prepared for inland provinces by Save Cambodia's Wildlife (and NGO) with support from MAFF, UNDP and GEF.

Pilot/demonstration activities of ***climate-resilient cultivation*** (as outlined in a separate CARP working paper, prepared in parallel).

A ***bridging programme***, possibly involving exchange visits by farmers and salinity control operators with peers in the ***Cuu Long (Mekong) Delta*** in Viet Nam, where a substantial experience has been achieved within cultivation in areas exposed to sea water intrusion.

Support to ***water user communities, farmer's communities and fisheries communities***, involving networking (learning from each other) and understanding of development opportunities and management options.

5.4 Long-term opportunities

Long-term initiatives, beyond the scope of the CARP (in terms of time and geographic coverage), may include for example

Support to ***dissemination of existing data*** (rainfall, wind, sea level); and guidance on improved monitoring (including inland surface water salinity and sunlight radiation) and data processing oriented towards scheme operation, choice of seeds, and structural design.

A ***'CC Atlas'*** for the coastal zone, including mapping of present (normal and extreme) rainfall and sea level, and flood risk. ***'Safe (evacuation) areas'*** could be included if practical.

Promotion of ***the use of maps***, and support to better accessibility of existing maps, as well as guidance on the use of satellite data and imagery, including resources readily available from the Internet.

Capacity-building in ***soil quality*** analysis and management, in support of guidance on selection of crop varieties, appropriate use of fertilizer and compost, and the prospects for alternative crops. In many places in the study area, soils are not readily suited for crops other than rice.

Support to national networking about ***drought preparedness and drought mitigation*** - not a problem today in the coastal area, but it could well emerge as a new CC-related challenge. National expertise is available and could be shared with peers in the coastal area.

A national MSc-level education in environmental management (including the climate perspective). (This is not available at present).

Support to ***a national professional organization*** in support of networking and knowledge-sharing among practitioners.⁶ The organization could collaborate with one or several universities and/or alumni networks. It could arrange seminars and workshops, facilitate exchange visits and secondments, and perhaps publish a small newsletter (or even a scientific journal).

Publication of ***policy briefs/case studies***, including success stories (for example about innovative cultivation techniques, niche products, and private sector involvement).

6 Conclusion

Many capacity gaps have been identified, but none that are '*critical*' to the pilot activities under the CARP to an extent that these activities are obstructed. Rather, a minor extent of immediate capacity-building can add value to the pilot activities and, at the same time, contribute to the basis for long-term generation of sustainable institutional capability. This can for example involve illustration of the significance of knowledge gaps; of the value of awareness; the benefits of inter-disciplinary coordination; and identification of opportunities and entry points to climate change adaptation.

Under the CARP, capacity-building activities can support the implementation of demonstration activities, while, at the same time, serve highly useful purposes in their own right.

Hereby, the CARP can contribute to improved sub-national capacity, but cannot serve the entire set of needs - which will take a much longer time and more resources.

⁶ There is already a Cambodia Climate Change Network (of NGOs)

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Appendix A: Agenda for the consultations

National level

The agenda for the consultations comprised, as relevant from case to case:

- Background and purpose of the meeting
- Related decrees/sub-decrees (existing and planned)
- Climate-related capacity-building initiatives (ongoing and planned)
- Needs of data and tools
- Training needs
- Suggestions and recommendations

Sub-national level

The agenda for the consultations comprised, as relevant from case to case:

- Background and purpose of the meeting
- Tasks and operation
- Organisational and procedural capacity: Staffing? Facilities (such as computer hardware and software, and transport)? Guidelines?
- Financial capacity (1), for routine operation and maintenance
- Financial capacity (2), for implementation of development initiatives according to plans
- Modalities for liaison with other management levels and with other agencies at the same level
- Water user and farmer communities?
- Relations with (1) the private sector; (2) with other stakeholders
- Availability of data and information?
- Human skills? Training needs?
- Education needs?
- Any suggestions on what could be done (but is not done today)?
- Other suggestions and recommendations

Appendix B: People met

Preah Sihanouk		
DOA	Mr. Chea Saly	Chief of Agronomy Office
	Mr. Chum Chanthol	Chief of Agricultural Extension Office
DOE	Ms. Chim Kalyan	Deputy Director
DOWRAM	Mr. Heng Sophornrith	Deputy Director
DRD	Mr. Ngoy Peng Chiv	Deputy Director
District representatives	Mr. Ork Song Horn	Deputy Director, Prey Nob District
	Mr. Oun Em	Officer, Prey Nob District
Community/commune representatives	Mr. Chun Sun Heng	Vice Chief, Tuek L'ak Commune
	Mr. Khuy Khay	Council member, Tuek L'ak Commune
	Mr. Nos Orn	Vice Chief, Tuek Thla Commune
	Mr. Prack Sarim, Chief	Sameakki Commune
Prey Nob FWUC	Mr. Nu Ramy	Executive Director
	Mr. Yim Boy	Chief
Koh Kong		
DAFF	Mr. Phong Livreak	Director, Department of Agriculture
	Mr. Leng Chan Sokthear	Officer, Agronomy Office
	Mr. Soun Noun	Chief of Veterinary Office
	Mr. Chhiv Reth	Vice Chief, Fisheries Office
	Mr. Seng Bunna	Officer, Fisheries Office
DOE	Mr. Moun Phala	Acting Director
	Mr. Hun Marady	Deputy Director
DOWRAM	Mr. Ev Vanna	Deputy Director
DRD	Mr. Som Chea	Deputy Director
District representative	Mr. Ben Vanna	Deputy Governor, Mondul Seima District
Community/commune representatives	Mr. Chey Yoen, community member, Peam Krasaob Commune	
	Mr. Chut Tit	Commune Chief and Community Chief, Peam Krasaob Commune
	Ms. Neang Kun	First Vice Chief, Peam Krasaob Commune
	Mr. Yem Yan	Vice Chief, Peam Krasaob Commune.
	Mr. Siak Samoun	Vice Community Chief, Peam Krasaob Commune
	Mr. Ty Vech	Commune Secretary, Peam Krasaob Commune
	Mr. Em Yoen	Community member, Peam Krasaob Commune

	Mr. Khoem Sanith, First Vice Chief, Toul Kokir Commune	
	Mr. Prark Dina	Commune Secretary, Toul Kokir Commune
Phnom Penh		
MAFF	Mr. Ouk Vibol	Acting Director, Dept. of Fisheries Conservation
	Mr. Hok Kimthourn	National Project Manager; Project Support Unit
	Mr. Ung Soeun	Senior Agricultural Officer, Agricultural Land Resource Management Department
	Mr. Oeurn Piseth	Agricultural Land Resource Management Department
	Mr. Suos Pinrealc	National Project Adviser, NAPA Follow-up Project
MOE	Mr. Thy Sun	Director, Climate Change Department
	Mr. Tong Bunthoeun	Deputy Director, Department of Wetlands and Coastal Zone
	Mr. Chhor Elett	Office Chief, Department of Environmental Education and Training
	Mr. Ek Menrith	Chief of GIS Office, Department of Natural Resource Assessment and Data Management
	Mr. Ou Sophorn	Vice Chief, EIA Department
	Ms. Mom Savy	Department of Environmental Education and Training
MOWRAM	Mr. Im Sophanna	Vice Chief of Weather Observations
	Mr. Oum Ryna	Acting Director, Department of Meteorology
CARDI	Dr. Khay Sathya	Plant Protection Office
	Mr. Touch Veasna	Soil and Water Science Office
NCDM	Mr. Khun Sokha	Director of Training Department
	Mr. Soth Kimkolmony	Deputy Director of Training Department
	Mr. Ku Bunnavuth	Deputy Director of Search and Rescue Department
UNDP	Mr. Dara Rat Moni Ung	Agriculture Portfolio and Policy Adviser, UNDP/IFAD
	Mr. Meas Bunly	National Communication Officer, NAPA Follow-up Project/UNDP
AFD	Dr. Muong Sideth	Project Officer

Appendix C: Provincial department profiles

DOE, SHV

Staffing; human skills	<i>Fair</i>
Availability of relevant data and information	<i>Fair/poor</i>
Facilities (IT, transport, monitoring)	<i>Poor</i>
Tools: Guidelines; decision-support tools	<i>Poor</i>
Financial resources:	
(1) for routine operation and maintenance	<i>Fair/poor</i>
(2) for development initiatives according to plans	<i>Inadequate</i>
Inter-agency networking	<i>Good</i>
Relations with service users	<i>Good/fair</i>
Relations with the private sector	<i>Fair/poor</i>
Relations with other stakeholders	<i>Good/fair</i>

23 technical staff, including 3 in districts.

DOE operates a laboratory, sponsored by Partnership for Environmental Management of the Seas of SE Asia (PEMSEA).

Only coastal waters are monitored; inland waters and groundwater cannot be monitored, due to lack of consumables for analysis.

Lack of orderly solid waste disposal.

Little information is available about agricultural pollution; there is some evidence of irregular import of pesticides from neighbouring countries.

Swallow's nest harvesting has been practised since 2010/2011, (in buildings constructed for the purpose, provided with music to attract the birds, also in housing areas). This causes some noise and smell.

Post-harvest preservation is a source of concern, but little information is available.

No information about pollution from livestock and prawn farming.

Blocking of surface flow (drainage) occurs, partly due to landfill activities and unsustainable land use changes.

Staff training would be useful - for monitoring, and other tasks, including pesticides - as well as climate change (CC) and climate resilience; coastal management; water pollution control; noise pollution and bad smell; data collection and data management; and proposal writing.

Guidelines would be useful.

DOE needs maps for its work, but cannot produce them by inhouse capacity.

CC-related data and information are limited, for example regarding sea level rise.

EIAs are conducted by MoE for projects above 2 MUSD. For smaller projects, no EIA, but sometimes a memorandum of understanding between the developer and DoE. Practices differ from one province to another.

Land use zoning would be useful for confinement of pollution and to prevent encroachment of protected areas.

Financial resources are inadequate.

Limited dialogue with the private sector, except for regular contact with Cintri (a solid waste contractor). Liaison also takes place in connection with occasional complaints about waste disposal and noise.

DOWRAM, SHV

Staffing; human skills	<i>Fair</i>
Availability of relevant data and information	<i>Fair</i>
Facilities (IT, transport, monitoring)	<i>Fair/poor</i>
Tools: Guidelines; decision-support tools	<i>Poor</i>
Financial resources:	
(1) for routine operation and maintenance	<i>Fair/poor</i>
(2) for development initiatives according to plans	<i>Inadequate</i>
Inter-agency networking	<i>Fair</i>
Relations with service users	<i>Fair</i>
Relations with the private sector	<i>Fair/poor</i>
Relations with other stakeholders	<i>Fair</i>

12 technical staff, covering irrigation and meteorology; none at district level. There is a scope for consolidation of in-house irrigation expertise.

A main task of this department is maintenance of the 90 km dyke protecting the 6 Prey Nob polders with their about 10,000 ha of rice fields. The dyke continues to sink year after year. It was constructed 0.8 m above sea level but has subsidised about 0.3-0.4 m in 6 years. Parts of Polders 5 and 6 are below sea level.

Yields in the polders vary from one place to another, from 1.5 t/ha to 2-3 t/ha.

Rainfall above 30 mm/hour prompts a stand-by at the dyke. On one occasion, in late September 2011, the rainfall was 140 mm/12 hours at Polder 6.

Funding is inadequate for routine operation and maintenance, not to speak of non-routine development initiatives. In 2003, the Japanese Embassy donated 60-70,000 USD for repair of 6-7 km of dykes. A proposal has been submitted to the Japanese Embassy for financial support to repair of dyke and water gate at Ou Oknha Heng in Prey Nob district.

Groundwater is not used in the province, due to high salinity.

Rainfall data are communicated daily by mobile telephone.

Dialogue/collaboration is maintained with the Prey Nob Polder Water User Community.

Training is needed about topographical mapping; GIS; weather forecasting; and irrigation technology and operation.

No relations with the private sector.

DOP, SHV

Staffing; human skills	<i>Good</i>
Availability of relevant data and information	<i>Good</i>
Facilities (IT, transport, monitoring)	<i>Fair</i>
Tools: Guidelines; decision-support tools	<i>Fair</i>
Financial resources:	
(1) for routine operation and maintenance	<i>Fair</i>
(2) for development initiatives according to plans	<i>Inadequate</i>
Inter-agency networking	<i>Good</i>
Relations with service users	<i>Good</i>
Relations with the private sector	<i>Fair/poor</i>
Relations with other stakeholders	<i>Good</i>

The department employs 29 government officials plus 9 officers in the districts.

National and sub-national planning

National

- 5-years sequential development plan; present one covers 2009-13 (synchronized with the mandate of the government)
- 3-years rolling Public Investment Plans (PIPs), revised annually

Province level

- 5-years sequential development plan; the present one covers 2011-15 (synchronized with the mandate of the government)
- 3-years rolling Public Investment Plans (PIPs), revised annually

District level

- 5-years sequential development plan
- 3-years rolling Public Investment Plans (PIPs), revised annually

Commune level

- 5-years sequential development plan; the present one covers 2008-12, synchronized with the mandates of the commune councils. A new plan will be prepared after the commune elections on 3 June 2012)
- 1-years rolling Public Investment Plans (PIPs), revised annually

The province-level 5-years plans take around 3 months to prepare. The work is prepared by a technical drafting group (which also compiles basic planning data). It has representatives by relevant departments. The plan is edited by a 24-members committee and is reviewed by another, 49-members committee. All 3 committees are headed by the provincial governor.

The PIPs take around 1.5 months to prepare.

The district-level plans are based on the commune-level ones. The process includes a district-level workshop for harmonization and integration of the commune plans.

The commune plans are prepared by a committee in each commune.

The entire process is assisted by guidelines and commune questionnaires. Climate change issues are being introduced (and will be addressed in a new guideline for commune planning, in preparation by MOP, expected in late June 2012). An important source of data is the Commune

Database (CDB), which is updated every year in December-March. This year's survey questionnaire include questions about climate-related concerns.

The sub-national planning process is the same all over the country, but the scope and emphasis of the plans vary from one province to another.

The private sector was invited to participate in the process, but only one company joined this year.

In Preah Sihanouk, the 5-years and 3-years plans encourage the private sector to participate in development of agriculture and development of dykes, flood protection, irrigation and water management, strengthening the FWUC, and rehabilitation of dykes and reservoirs.

One goal is to increase livestock breeding in response to the population growth, and to reduce import of meat from neighbouring countries.

Funds are inadequate. NCDD supplies 4-5,000 USD per year, but this year only 3,000 USD. No budget for specific development initiatives.

Training needs include climate change issues, as a basis for guiding the communes.

DOA, SHV

Staffing; human skills	<i>Good</i>
Availability of relevant data and information	<i>Fair</i>
Facilities (IT, transport, monitoring)	<i>Fair/poor</i>
Tools: Guidelines; decision-support tools	<i>Poor</i>
Financial resources:	
(1) for routine operation and maintenance	<i>Fair/poor</i>
(2) for development initiatives according to plans	<i>Inadequate</i>
Inter-agency networking	<i>Good</i>
Relations with service users	<i>Good</i>
Relations with the private sector	<i>Fair/poor</i>
Relations with other stakeholders	<i>Good</i>

The department has 41 staff + 5 at district level.

The province has 8 agriculture communities (including 5 in Prey Nob). One more was established in February this year (in Toeuk Thla commune).

Since 2009, the department has encouraged ST rice varieties, starting with small demonstration initiatives, using the following seeds: Chul'sa; IR 66; Sen Pidao; CAR 6 and Phka Rumduol. Seeds are in short supply, though.

Rice is sown at the end of May, to be transplanted in June-July.

The rice crops are vulnerable to storms.

Farmers are in need of education related to shift from LT to ST varieties; and also related to processing and marketing; growing vegetables; and CC adaptation.

Drought is a particular potential vulnerability; but it is not clear what to do about this. In the last 3 years, the rainfall has been around 2,200-2,300 mm/year, which is well below the normal level of above 3,000 mm/year.

A new dyke has been proposed east of Prey Nob (near National Road 3), to protect against sea water intrusion, but the scheme is opposed by fishermen and aquaculture producers.

The department needs additional expertise within agriculture and water resources, and expertise in CC adaptation.

DRD, SHV

Staffing; human skills	<i>Fair</i>
Availability of relevant data and information	<i>Fair</i>
Facilities (IT, transport, monitoring)	<i>Poor</i>
Tools: Guidelines; decision-support tools	<i>Poor</i>
Financial resources:	
(1) for routine operation and maintenance	<i>Poor</i>
(2) for development initiatives according to plans	<i>Inadequate</i>
Inter-agency networking	<i>Good</i>
Relations with service users	<i>Good</i>
Relations with the private sector	<i>Poor</i>
Relations with other stakeholders	<i>Good</i>

The department has 23 government officers in the main department. There are no officers in the districts.

There is one village development committee in Prey Nob.

In August 2011, some officers participated in a workshop on climate change organized by MRD.

CC is damaging laterite roads, culverts, bridges and other infrastructure. Damages are reported to the Ministry, but there is no capacity for mitigation.

The department maintains 20-30 km of roads with a budget of 25,000 USD per year.

UNICEF has provided financial support for sanitation and repair of wells (from 2008 to 2012). There is no arsenic in the groundwater.

SHV Provincial Hall

Staffing; human skills	<i>Good/fair</i>
Availability of relevant data and information	<i>Fair</i>
Facilities (IT, transport, monitoring)	<i>Fair/poor</i>
Tools: Guidelines; decision-support tools	<i>Fair/poor</i>
Financial resources:	
(1) for routine operation and maintenance	<i>Fair/poor</i>
(2) for development initiatives according to plans	<i>Inadequate</i>
Inter-agency networking	<i>Good</i>
Relations with service users	<i>Good</i>

Relations with the private sector	<i>Fair</i>
Relations with other stakeholders	<i>Good</i>

Sihanouk Province has 3 districts, 1 municipality, and 26 communes/sangkats.

Several activities are conducted in partnership with in Environmental Management for the Seas of East Asia (PEMSEA) under the Integrated Coastal Management (ICM) project, such as

- Community-based solid waste management, collaborating with Cintri (a private operator)
- Tourism development
- Resource conservation, including mangrove replanting
- Community-based fisheries management

Good relations are maintained with MOE, communities, NGOs, and the academic community. A survey on solid waste is made in collaboration with the Royal University.

Coastal zoning is piloted in collaboration with private developers. At Ocheu Teal Beach, zoning has been implemented for swimming, vendors and touring boats.

Impacts of climate change include

- Coastal erosion (caused by storms and sea level rise)
- Loss of livelihoods within agriculture, fisheries and tourism. The number of fishing days is reduced due to storms from July to August
- Damage to the paddy fields (caused by sea level intrusion and sea level rise)
- Damage to coral reefs
- Impacts to human health

Flooding in 2009 damaged rice in Prey Nob district, and damaged rice and livestock in Kampong Seila district.

The storm frequency has escalated over the last 5 years. Today, storm damages occur every year, affecting property, rice, vegetable and fruit trees in Sameakki, Tuek L'ak and Tuek Thlar communes, Prey Nob district.

Public awareness must be built at community-level, because of the various new climate-related challenges. This, in turn, requires training in CC adaptation.

Financial capacity: The budget is inadequate for routine operation; no budget is available for support to a (much needed) dike construction at Prey Nob.

DOA, KK

Staffing; human skills	<i>Good</i>
Availability of relevant data and information	<i>Fair</i>
Facilities (IT, transport, monitoring)	<i>Fair/poor</i>
Tools: Guidelines; decision-support tools	<i>Poor</i>
Financial resources:	
(1) for routine operation and maintenance	<i>Fair/poor</i>
(2) for development initiatives according to plans	<i>Inadequate</i>
Inter-agency networking	<i>Good</i>

Relations with service users	<i>Good</i>
Relations with the private sector	<i>Fair/poor</i>
Relations with other stakeholders	<i>Good</i>

This department has 46 officers

Peam Krasaob: Most people earn their living from fishing, with some vegetable cultivation and small areas of paddy. Before, LT rice was grown, but now mostly MT, due to sea water intrusion.

Tuol Kokir: Most farmers grow one crop per year. Before, the yield was 1 t/ha, but today, it is up to 3 t/ha in areas far from the sea, and 1.2 t/ha in areas near the sea. The province average is 2.6 t/ha.

Cultivation starts in late May/early June, depending on the rainfall, with transplanting after 30 days. One farmer in Tuol Kokir is piloting 2 crops per year, the 1st one starting in January/February, depending on the rain, and the 2nd one in May/June. The 1st crop is sown directly, while the 2nd one is transplanted.

3 types of ST rice (105 days) are promoted to farmers: Sen Pidao, IR66 and Chul'sa. These varieties need less water to cultivate. The farmers are unfamiliar with ST rice, however.

Salt-tolerant varieties are under consideration, with inspiration from Bangladesh. One new MT variety, Phka Rom Dual, has been successfully introduced since 2011 on a 2 ha area (and more this year), using seeds from CARDI. This variety is salt-tolerant. It is transplanted after 15-25 days. It is photo-sensitive, maturing in November, typically after 5 months. It is well suited for export.

LT rice is harvested 6 months after transplanting.

Farmers have a tendency to use too much seeds (60-70 kg/ha rather than 20 kg/ha).

Cultivation is under threat from (1) sea water intrusion; and (2) increasing rainfall (now 3,800-4,000 mm/year) (heavy rain is a threat during transplanting). Other threats are insects (including a new kind), wild birds and rats that damage the rice. Storms occur in the area, but mostly early in the cultivation cycle, when the impact is moderate, or after harvest. Drought is not a problem in this area.

Natural pest control and natural fertilizers are promoted.

A reservoir is in need of rehabilitation.

Livestock: The most common livestock is buffalos for use in the fields. The owners just keep them during the cultivation period and release them to the forest after the cultivation season. This can be risky, however. Vaccines are applied twice per year (but the farmers do not trust them).

Care, an NGO, has promoted chicken; but most people prefer fishing. This is because meat is sold at a low price (facing competition from cheap imports from Thailand), while the price of chicken and pig fodder increases year by year.

Fisheries: The fishermen operate close to the coast, because of small boats. There is some mariculture in the dry season, using 3m x 3 cages. The yield is 20 t/year for the two communes combined. Species cultivated are barramundi (?) Lates Calcarifer (?), fast-growing, fingerlings imported from Thailand; and humpback grouper (?) (Cromileptes Altivelis (?)) and some related

species, with fingerlings caught locally. They are fed on sponge fish and try tok ke (?). The fish cultivation is impeded by a parasite (gill lice (?)), affecting 70-80 % of the stock this year.

Suggestions:

- Create farmer communities (for knowledge-sharing and introduction of new technology). One exists today; but different thematic ones would be better.
- Train the farmers in using less seeds.
- Livestock should be kept at home, rather than in the forest. Farmers should be trained in producing fodder from materials around their villages.
- Promote the use of vaccines.

DOWRAM, KK

Staffing; human skills	<i>Inadequate</i>
Availability of relevant data and information	<i>Fair</i>
Facilities (IT, transport, monitoring)	<i>Poor</i>
Tools: Guidelines; decision-support tools	<i>Poor</i>
Financial resources:	
(1) for routine operation and maintenance	<i>Inadequate</i>
(2) for development initiatives according to plans	<i>Inadequate</i>
Inter-agency networking	<i>Good</i>
Relations with service users	<i>Good/fair</i>
Relations with the private sector	<i>Good/fair</i>
Relations with other stakeholders	<i>Good/fair</i>

The department has 6 officers, none at the districts.

It operates 4 rainfall stations. There is no equipment for salinity measurements.

MOWRAM operates a national Cambodian Irrigation Scheme Information System. There is an annual report on weather events.

There are two FWUCs in this province (Kandoul and Phom Khlong) (outside the CARP target area). The one in Kandoul works well, but the one in Phom Khlong faces occasional problems with sea water seepage through the bottom of the water gate (due to a lost rubber sealing ring).

Tuol Kokir Commune has an old dike which was constructed during the Khmer Rouge Regime. It normally works, but sometime there is flooding over the dyke, and there are problems with 3 wooden watergates (the ones made of steel were stolen). There is also an old canal built by the commune itself.

An application for support to repairs was submitted to the Japanese Embassy in 2011 (but is not yet approved, due to the Japanese earthquake and tsunami disaster).

AFD provides technical support to DOWRAM on mapping and GIS (2010 to 2012).

No collaboration with the private sector.

The department informs the districts and the radio stations about storms, heavy rain or storm surge by mobile phone or e-mail. Most farmers get their weather information from Thai TV and radio.

The department needs expertise and training in irrigation and meteorology.

Suggestions:

- Repair dyke in Tuol Kokir Commune (which supports more than 100 ha of paddy).

DOE, KK

Staffing; human skills	<i>Fair</i>
Availability of relevant data and information	<i>Fair</i>
Facilities (IT, transport, monitoring)	<i>Poor</i>
Tools: Guidelines; decision-support tools	<i>Poor</i>
Financial resources:	
(1) for routine operation and maintenance	<i>Fair/poor</i>
(2) for development initiatives according to plans	<i>Inadequate</i>
Inter-agency networking	<i>Good</i>
Relations with service users	<i>Good</i>
Relations with the private sector	<i>Good</i>
Relations with other stakeholders	<i>Good/fair</i>

There are 23 government officers (at the main office and the districts),

22 rangers are employed in Peam Krasaob and Tuol Kokir Communes, who monitor the multiple use areas of Dong Peng, Bottum Sakor Wildlife Sanctuaries and Som Kos. There are more rangers elsewhere in the province. They are employed by DOE on 1-years contracts that are often extended from year to year.

Peam Krasaob and Tuol Kokir Communes: The rainfall is a bit different from elsewhere in Cambodia. The rainy season starts in April. Drought is not a problem; but sea water intrusion affects rice fields, vegetables, fruit trees and household water supplies. Also, drainage of the paddy fields is a problem during heavy rains.

Floods occurred in October 2011.

The paddy area in Peam Krasaob is smaller than in Tuol Kokir. Tuol Kokir has vacant land where trees could be planted; but the ownership is unknown (probably either the communes or DOF).

Choice of well suited varieties is a challenge.

Paddy farmers in Tuol Kokir apply chemical fertilizers and pesticides. No problems have been reported with the fertilizers, but the pesticides can affect the crops.

In the last 4-5 years, rice crops in Tuol Kokir have been exposed to red snails eating the rice plants. This species (incidentally imported from Thailand by a curious farmer) is spreading fast. Farmers try to use pesticides to kill the snail, but this also kills crabs and fish in the paddies.

The paddy fields as such are not suited for other crops, but some can be cultivated near the homes.

Fisheries is a livelihood in both communes. Most fishermen operate near the mangroves and the coast, because their boats are small (a few ones with bigger boats can operate further offshore). Catches include fish, shrimps, crabs and snails.

The villagers in both communes use well water (typically in the dry season, and typically in Tuol Kokir Leu Village) and rain harvesting (typically in the rainy season, and typically in Tuol Kokir Krom Village). There are two types of dug wells: With and without concrete (precast pipe) lining. The groundwater is saline in some places, and some households buy vended water (at 4,000 riel per 200 litres). In some cases, water for uses other than drinking and cooking is available from ponds. Water for households on islands is supplied by boat.

Sanitation is another concern, managed with some support from DRD.

Suggestions

- New dykes and watergates are needed in both communes to protect against flooding and to control sea water intrusion and drainage.
- Technical support is needed for seed selection; and use of fertilizers and pesticides.
- Support to household water supplies: Plastic containers for rainwater harvesting, and/or ponds for freshwater storage.
- Zoning of community forest; planting more trees and mangroves.
- Creating a new community for solid waste management, and related training and awareness-building.
- Support to microcredit/savings groups. A (successful) one exists in Peam Krasaob.

Capacity building needs include

- Training on climate change in general
- Training on climate-related evaluation and impacts assessment
- Facilities: Computers, printers, photocopier, furniture, vehicles (a speedboat and 2 motorcycles donated by Danida are now defunct)

Both department staff and rangers need training in CC implications.

After the 2011 floods, rangers were unprepared for appropriate damage assessment and reporting.

The Coastal Resources Centre needs comprehensive repairs.

DOP, KK

Staffing; human skills	<i>Good</i>
Availability of relevant data and information	<i>Good/fair</i>
Facilities (IT, transport, monitoring)	<i>Fair</i>
Tools: Guidelines; decision-support tools	<i>Good/fair</i>
Financial resources:	
(1) for routine operation and maintenance	<i>Fair</i>
(2) for development initiatives according to plans	<i>Inadequate</i>
Inter-agency networking	<i>Good</i>
Relations with service users	<i>Good</i>
Relations with the private sector	<i>Good</i>
Relations with other stakeholders	<i>Good</i>

The planning process

The provincial 5-years plan is produced by a committee, headed by the governor, and with representatives from all departments. There are working groups for compilation and assessment of basic planning data; and for compilation of the plan and the associated 3-years PIP.

The draft is reviewed by the Provincial Council's Technical Coordination Committee (PCTCC)⁷. The PCTCC is chaired by the provincial governor; the vice chair is the provincial deputy governor, and the provincial administration are permanent members. Other members are all district governors, two provincial councils, and all provincial department directors. This committee is responsible to provide comments and recommendations to the Committee of the Provincial Council (CPC).

The communes produce 5-years sequential development plans and 1-year investment programmes. The districts and the provincial town produce sequential 5-years plans and rolling 3-years investment programmes, updated each year.

The rolling 3-years investment programmes (at province and district level) are uncertain in the last 1-2 years of the 5-years plans, to the extent that they reach into a period that is not covered by any 5-years plan.

The provincial planning addresses CC, but to a basic extent, merely listing floods, drought, sea level rise and storm frequency. This is due to lack of knowledge and tools for analysis. Guidance on CC implications is needed from the national level. The survey questionnaire for the 5-years plans (provided by NCDD) included a table about CC causes and effects, but there were no replies.

Weather- and climate-related challenges include frequent storm surges; drought; increased temperature; changed rainfall pattern; and high rainfall. One issue is safe areas for flood evacuation, under impression of experience from the 2011 flood. Development goals in Koh Kong province related to climate change and natural disasters include better preparedness for search and rescues; and motivation to adapt to climate change.

Maps are available at the Provincial Hall (but are not widely used). DOP has a census map. GIS is not applied.

Agriculture and livestock

Rice yield in this province is less than 1.8 t/ha, because farmers still implement traditional cultivation. There is limited use of chemical fertilizers, and limited capacity for selecting appropriate seeds. Some paddy fields are exposed to sea water intrusion, and there are attacks by insects.

The land use is changing, with some paddy areas abandoned, some used for construction, and some located in protected areas.

Farmer breed livestock as draught animals for cultivation, for surplus income, and to provide protein in rural communities. Issues include the use of traditional feeding; limited knowledge and availability of quality breeds; limited access to veterinarian services in remote areas; and scepticism to the benefits of vaccination.

Development goals in Koh Kong province related to agriculture and livestock: Generally increased capability and human resources development; better marketing; strengthened legal framework; strengthened management of sustainable agricultural land use; and improved

⁷ The PCTCC was created by Sub Decree 218 adopted on 14 December, 2009. Its work is guided by Guideline No 036 adopted on 28 December 2010 by Ministry of Interior

livestock feeding. There is lack of knowledge about appropriate seeds. This would be facilitated by better data.

Fisheries

There are 13 Fisheries Communities in Koh Kong (based on a royal decree on 29 May 2005 and a sub-decree dated 10 June 2005).

The fish catch declined slightly from 35,700 t in 2008 to 34,900 t in 2010. The decline is ascribed to overfishing (modern equipment and increasing number of fishermen); degradation of marine ecosystems; and climate change.

Aquaculture is slightly increasing, both inland and marine. The sector needs technical strengthening, and access to food processing and packing (which are unavailable in Cambodia at present).

Inland fish catches were 150 t in 2010 and 210 t in 2011. Marine fish catches were 34,750 t in 2010 and 41,700 t in 2011. Mariculture produced 350 t in 2010 and 96 t in 2011 (check!), and inland aquaculture 58 t in 2010 and 56 t in 2011. Another 887 t were produced of green mussels, other shellfish, shrimps and crabs in 2010, and 712 t in 2011.

There are 5 fish nurseries in the province, producing 1,000,000 fingerlings.

Development goals in Koh Kong province related to the fisheries sector: Increased production (to serve the market demand); encouragement of manufacturing and fish food processing; strengthened resource management and sustainable resource utilization.

Water resources and meteorology

There are 6 estuaries in Koh Kong Province, with high potentials for hydropower, navigation and tourism.

There is a clear scope for expanded irrigation.

There are two FWUCs, in Srey Ambil and Bottom Sakor districts.

Development goals in Koh Kong province related to water resources and meteorology: Better use of the potential of areas that are or can be cultivated; rehabilitation of seawater dikes; strengthening of FWUCs; and improved management of meteorology stations.

Good weather forecasts would make life easier for the fishermen.

Protected areas

Healthy mangroves are decisive for the fisheries yield.

Koh Kong covers a land area of 568,450 ha, almost 50% of which are protected areas:

- Bottom Sakor National Park 171,250 ha (50% of which is along the coast)
- Peam Krasoab Wildlife Sanctuary: 23,750 ha in Mondul Seymar district
- Parts of Samkoh Wildlife Area: 333,750 ha
- Ramsar wetlands: 12,000 ha

Suggestions

- CC training is required. So is better knowledge about the weather.
- Better seeds must be applied to adapt to climate change.

- Mangroves must be protected.
- CC data and information are requested from MOE/DOE.

KK Provincial Hall

Staffing; human skills	<i>Fair</i>
Availability of relevant data and information	<i>Fair</i>
Facilities (IT, transport, monitoring)	<i>Fair/poor</i>
Tools: Guidelines; decision-support tools	<i>Fair</i>
Financial resources:	
(1) for routine operation and maintenance	<i>Fair/poor</i>
(2) for development initiatives according to plans	<i>Inadequate</i>
Inter-agency networking	<i>Good</i>
Relations with service users	<i>Good</i>
Relations with the private sector	<i>Fair</i>
Relations with other stakeholders	<i>Good/fair</i>

Koh Kong Province

The province has 6 districts and 1 municipality, with 26 communes and 3 sangkats.

It has a University of Management and Economy (UME) (?) with some 50 students, who pay 320 USD per year.

The rain pattern has changed since 1987. In the past, the rain started in July; but now it starts from May - usually with some rain in May and heavy rains in July.

The Provincial Hall is concerned about the increased temperature, change in rainfall, and frequent thunderstorms.

The Province recognizes that climate change is a new issue, which is difficult to integrate into the 5-years development planning.

Relations with the private sector

There is good cooperate with LYP Group Ltd. in connection with sugar cane cultivation and road construction; and with U Yean Development Co. Ltd within road construction in Kirsakor.

The private sector participates in the planning, not as formal committee members, but as dialogue partners - for example owners of restaurants along the coast; sugar cane growers; and land concession holders.

Suggestions

CC training (inter-disciplinary) is needed in general,

Training is needed to floating villagers (to adapt to CC) in particular.

Training in marketing (of fish, fruit and vegetables) would be useful.

Farmers should be educated to increase the agricultural production.

Brand marketing of some well-known niche products could be promoted - such as banana wine in Thmar Bang District, and Kapi (a kind of shrimp paste) in Peam Krasaob.

DRD, KK

Staffing; human skills	<i>Fair/poor</i>
Availability of relevant data and information	<i>Fair</i>
Facilities (IT, transport, monitoring)	<i>Poor</i>
Tools: Guidelines; decision-support tools	<i>Poor</i>
Financial resources:	
(1) for routine operation and maintenance	<i>Poor</i>
(2) for development initiatives according to plans	<i>Inadequate</i>
Inter-agency networking	<i>Good</i>
Relations with service users	<i>Good</i>
Relations with the private sector	<i>Fair/poor</i>
Relations with other stakeholders	<i>Good/fair</i>

The department has 10 offices with 22 government officers. There are no district officers.

The rainfall is changing in the province. This year, it started to rain in February.

The majority of villagers in Peam Krasaob are fishing; less are paddy farmers. In Tuol Kokir, villagers are fishing and cultivating. In the floating villages, fisheries is the predominant livelihood. Most fishing is from small boats (that can only operate in fair weather). The larger boats that operate in the area are from Thailand.

Now, some fishermen in Peam Krasaob change their occupation from fishing to become boat operators or souvenir vendors, because the fish catch is declining.

Appendix D: Notes from consultation meetings

By order of chronology

Disclaimer: The notes below have not been reviewed by the various informants and resource persons and do not necessarily reflect their opinions correctly

Department of Fisheries Conservation, MAFF

23 July 2012 8:30 at Dept. of Fisheries

- 1 Background information was exchanged.
- 2 The department (with 22 staff) is one of 5 departments and 2 research institutes under the Fisheries Administration, with its some 1,200 staff, covering inland and marine fisheries. The staff level is on the low side considering the various tasks.
- 3 Its 10-years strategic plan covers CC; but specific, operational CC knowledge is needed. There are considerable uncertainties regarding actual CC implications.
- 4 There is a sub-group for CC, as well as one for hydropower dams, and one for fisheries reform.
- 5 Particular coastal resources include a huge area of seagrass (Kampot); huge areas of coral reef (Preah Sihanouk province); and huge areas of mangrove ecosystem (Koh Kong province).
- 6 A pilot CC study has been conducted in Pursat Province (Kom Pong Tract Conservation Area).
- 7 The Department works with Flora and Fauna International (FFI) in connection with management of marine fisheries resources in 2 islands (Koh Rong and Koh Rong Senlem). The objective of the Marine Fisheries Management Areas are a) to sustain fishing activities, b) to protect the biodiversity, and c) to promote ecotourism.

By 2010, around 90 percent of coral reefs around these islands are bleaching, because the sea temperature has reached around 35 deg. C - above the limit of 32 deg. C. Support to rehabilitation has been granted by the British government.
- 8 Also, the Department collaborates with PEMSEA on conservation of 2 mangrove areas in Preah Sihanouk Province.
- 9 It is found that mitigation is difficult - for example it is not practical to control the storms, temperature and flooding - while adaptation is possible. CC adaptation in the coastal zone includes (i) habitat conservation, and protection of 58 endangered species; (ii) sustainable aquaculture development (small, medium and large-scale) (and introduction of new, better suited species); and (iii) livelihoods implications, including support to fisheries communities.
- 10 Mangrove conservation is covered by DOF as well as by MOE; but MOE's legislative framework is not in place; the DOF framework is better suited.
- 11 Clear zoning (including buffer zones) is important for conservation.
- 12 Voluntary conservation efforts (in the mangrove areas) include 40 commune-level management areas along the coast, plus national and province-level areas. Fishing gear is regulated. Eco-tourism and sustainable resource-based livelihoods are encouraged.
- 13 Crab banks, supported by microcredit, are managed by community committees. People catch the crabs that carry eggs and hand them over to community's cages in the river.

The female crabs (with 1-1.5 mio. eggs per crab) are identified by writing a code on their shell; they are released in the sea grass areas, not the mangroves (swimming crabs). The scheme can increase the crab yield by a factor 4.

Marine Fisheries Management Areas (MFMA's)

MFMA's are established at i) the national level, ii) the provincial level, and iii) the commune level. The commune level has 40 MFMA's along the coast.

The Fisheries Administration provides the over-all marine areas for the communities, and then the communities create smaller areas as no-take zones. The process must involve consultations among the all stakeholders to reach an agreement among the majority to create the zone. The size of the MFMA should not be too big and too small.

There is a need to produce internal regulations or guidelines to protect the fishing zone, and to promote the concept to local people (fishermen) who live outside the community, so that they understand and observe the conservation areas. Also, types of fishing gears must be regulated in the community fishing areas.

The provincial level needs to work with relevant provincial departments. Also at the national level, consultations are needed with relevant institutions.

- 14 Sea horses are exported to China as medicine. They are protected by concrete boxes (to impede seabed trawling). (Such concrete boxes are also applied to prevent trawling in other areas).
- 15 The following documents were kindly handed over: The Strategic Planning Framework for Fisheries 2010-19, Volume 1: Fishing for the Future; Volume 2: Background Information; and Volume 3: CAMCODE: Cambodian Code of Conduct for Responsible Fisheries.
- 16 There is adverse interaction between sand dredging and green mussels and crabs (that prefer clear water).
- 17 The staff is in need of better knowledge about CC implications.
- 18 The department is in need of additional funding of its activities.

*

Department of Environmental Education and Dissemination, MOE

23 July 2012 10:40 at Office of Environmental Education and Training

- 1 Background information was exchanged.
- 2 This department has 29 government staff (some of which are newly recruited). It assists with awareness-building and training, and produces booklets, videos and posters; but it is short of funds for implementation.
- 3 A master plan for education has been prepared, but has not been implemented. They include (i) training to provincial staff; (ii) training of trainers; and (iii) compilation of documents for environmental education. Activities are coordinated within CCD, but not with Ministry of Education (except for (iii)).
- 4 The department collaborates with most universities in Phnom Penh, about environmental promotion, awareness-building and related social activities (such as concerts, and tree-planting ceremonies); 5 June is observed as 'World Environment Day'; and 23 November is observed as 'Environment and Sanitation Day'.
- 5 The department has produced a text book for primary school teachers, back in 1996; it has been revised, but no funds are available for printing. An environmental magazine is

published every 3 months. Another publication is 'The Voice of the Wildlife', for traditional Buddhist education.

- 6 The department has organized 27 youth debates (on environmental Issues) at national television.
- 7 Training of trainers in CC is requested.

Scope on youth debates on TV

- Dissemination of information and public awareness-building on the importance of environmental preservation in general, as well as specific environmental issues and solutions to prevailing environmental problems.
- Promotion of public awareness on natural resources issues, such as bio-diversity, fisheries, flooded forests, forestry, clean water and energy, and consequences affecting the living standards of the people.
- Providing people, students and civil servants with an opportunity to exchange environment-related knowledge, such as preventive methods on consequences of natural resources degradation for supporting the living standards of people and the environment.
- Strengthening the youth networks for studies, research and working together for the cause of environment and development.
- The general public will obtain information and new knowledge from the discussions and debate.
- An opportunity is provided for capacity building in negotiation and advocacy on issues of environmental management.

*

Department of Wetlands and Coastal Zone, MOE

23 July 2012 14:30 at Department of Wetlands and Coastal Zone

- 1 Background information was exchanged.
- 2 The department is placed under General Directorate of Administration of Natural Protection and Conservation, MOE. It has 25 staff, with additional new staff presently being recruited. It works with Tonle Sap; and used to employ rangers in protected areas in the coastal zone; but not anymore, due to lack of funds. Rangers remain in 23 other protected areas, however. IUCN provides some support to training of rangers.
- 3 One issue in the coastal areas is the population increase, which affects the mangrove ecosystem by increased cutting of mangroves to make a living. This interacts with more frequent storms and heavy rains, amplifying the need to make a living based on income from deforestation.
- 4 The department holds an annual '*Wetlands Day*' to educate local authorities and students in wetlands conservation. This event has been held in Siem Reap, Kg Thom, Pursat and Koh Kong (in 2010). It has been well received, but without much public exposure in the newsmedia, due to lack of funds.

Each such event costs less than 10,000 USD (but not quite enough). Private sponsors are not interested in contributing.
- 5 The department is involved in management of RAMSAR areas (Stung Treng, featuring mountain crocodiles; Koh Kabi; plus a new one in Boeung Tonle Chhmar). This is done in collaboration with IUCN. It is not involved in '*Green Growth*'.

- 6 There are 3 Ramsar areas: Stroeung Treng in Stroeung Treng, Koh Kapi in Koh Kong, and Boeng Chhmar in Pursat. In addition, the department has proposed one additional area in Prek Toal (at Tonle Sap Lake) (Battambang Province). The purpose of the Ramsar areas is to maintain the wetlands ecosystems.
- 7 Population increase in the coastal zone interacts with climate-related pressures; such as frequent storms and heavy rains. It is jokingly said that the bad weather causes people to stay at home, to make more babies ;-)
- 8 Recently, a Malaysian expert found that 3 supposed peatlands did not exist; but a new one, in Koh Kong, was identified.
- 9 No information about new decrees/sub-decrees related to green growth.
- 10 The department needs training in coastal CC implications.
- 11 A wetlands day flyer and a RAMSAR booklet were kindly handed over.

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Agricultural Land Resource Management Department, MAFF

24 July 2012 08:00 at Agricultural Land Resource Management Department

- 1 Background information was exchanged.
- 2 This department is a new one; it is placed under General Directorate of Agriculture of MAFF. It has 28 staff, working closely with province department staff. Its operation relies entirely on government funding (which is inadequate).

Tasks include (i) soil classification (including analysis) (starting in Kg. Cham); (ii) guidance to farmers about soil management and soil improvement; and (iii) monitoring of land use changes.
- 3 The initial soil maps are from 1963, produced with support from USA. They apply 3 classes and 16 kinds of soils. Sandy soils need less water and are better suited for crop diversification. These maps are still in use in some places.
- 4 MRC conducted a soil classification (covering 10 provinces in the Lower Mekong parts of the country) in 1999-2000, applying 36 soil types.
- 5 In 2005-08, a collaboration took place with the Thai government about soil analysis and introduction of new crops (castor beans for biofuel; corn; and beans).
- 6 Acid sulphate soils are a particular challenge. These soils need more water for their cultivation - otherwise the soils structure will degrade.
- 7 Soil improvement is a major challenge in coastal areas with poor soils; but no clues about how to do it! The coastal area has different soil types, and it is difficult to assess the potential for alternative crops (other than rice). A soil classification has not yet been conducted in the coastal area, so it is difficult to make recommendations.
- 8 An experiment is being considered related to pineapple cultivation in Koh Kong: To establish a bund and keep it for 2 years before growing pineapples.
- 9 In Prey Nob, during the French regime, some lands were deliberately inundated by sea water for a period of 3 years, to clean the area of some detrimental organisms; but the treatment destroyed the soil structure. Compost is needed for rehabilitation.

- 10 National knowledge-sharing is practised as an annual MAFF event, with participation by more than 100 farmers selected by the province departments.
- 11 Guidance to farmers is needed about appropriate choice of fertilizers. Today, most fertilizers are imported from Thailand and Viet Nam, with little guidance on how to use them. 18 provinces (not including the coastal zone) are piloting a programme that promotes appropriate use of fertilizer, considering the specific types of soils. This is done in collaboration with the provincial departments and CARDI.
- 12 Little scope is seen for collaboration with the fertilizer suppliers; but there are plans to involve them in teaching the farmers how to choose the right type.
- 13 The department is interested in collaborating on pilot and demonstration activities under the CARP.

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Agence Française de Développement (AFD)

24 July 2012 10:15 at AFD

- 1 Background information was exchanged.
- 2 The present yield in the Prey Nob polder area is 2.5-3.5 t/ha (as compared with 1-1.5 t/ha in the past). Better seeds could further increase the yield.
- 3 Land prices are escalating, and some people buy land for investment; land ownership is in a state of transition. Part of the area, some 400 ha, is caught up in a dispute (running since 2004) between MOE and MLMUPC. Another 400 ha is located within the Ream National Park.
- 4 The design of the Prey Nob Polders assumed 5 cm/year subsidence. There is no information (and no definitive evidence) about the actual subsidence in the area behind the dykes.
- 5 The Prey Nob FUWC collects 200,000 USD per year from the farmers (around 15 USD per ha per year). 70% of this money is spent on dyke maintenance. Repairs are required every year. However, commitment from the government is also needed to support maintenance of the outer main dyke along the coast.
- 6 Double cropping is complicated in the Prey Nob area even though there is a big reservoir on the right hand side (Ou Oukhaheng reservoir), because of conflicts between the users. Furthermore, it is not clear whether or not the reservoir is enough to irrigate 100,000 ha. It would be good if the CCCA can look into this issue.
- 7 Two old polders along National Road 3 are defunct; there could be a scope for rehabilitation.
- 8 AFD can provide loans to (private) water supply operators, collaborating with Acleda and SBC Bank; but most are too small to qualify.
- 9 A scope is seen for improved MAFF/MOWRAM collaboration; and MEF is pushing; but an annual coordination meeting doesn't work well.
- 10 EU is preparing a new (17 million EUR) livestock programme; information can be obtained from m. George Dehoux.
- 11 There are examples of private sector involvement in irrigation (and double cropping) in Takeo, Prey Veng, Kandal and Kamchay.

- 12 AFD is not involved in groundwater exploitation.
- 13 AFD has no sea level data.
- 14 A collaboration with IUCN is in progress about mangrove conservation.

*

Department of Meteorology, MOWRAM

24 July 2012 14:30 at Department of Meteorology

- 1 Background information was exchanged.
- 2 The department has 44 staff members.
- 3 MOWRAM provides water resources and meteorology information services for climate change adaptation in Cambodia in general. The department is involved in modelling of basic data and scenarios.
- 4 Offshore data are sparse, considering the prospects for offshore drilling. Tide and storm surge data are available from model simulations, but not from measurements. Monitoring is being proposed and will be discussed at a CDC meeting on 31 July 2012. It is hoped that better data will be available within a few years.
- 5 A MOWRAM weather website is in preparation. Today, weather forecasts are disseminated as tables, via around 10 TV channels; and via radio in remote areas, and (soon) via mobile telephone in less remote areas.

*

NAPA Follow-Up Project, UNDP/MAFF

24 July 2012 16:00 at MAFF

- 1 Background information was exchanged.
- 2 The project works with commune-level planning; and deconcentration/ decentralization reform (at the national and sub-national level), supporting livelihoods adaptation to climate change. It collaborates with various MAFF departments, for example within flooding and animal health. It also collaborates with CARDI (with promotion of resilient rice varieties), and is involved in rehabilitation of water infrastructure. Priority areas are Preah Vihear and Kratie Provinces.
- 3 It applies Vulnerability Reduction Assessment (VRA), a concept developed by UNDP; and promotes community-based early disaster warning.
- 4 Floods, drought and livestock diseases are major challenges.
- 5 A shift to MT/ST rice varieties is generally encouraged. Double-cropping is more difficult (but is piloted by some farmers). The farmers can benefit from learning to grow various vegetables; raise pigs and chicken; and to involve themselves in aquaculture (inland and marine); and non-land-based activities.
- 6 Mangrove planting and tree planting are also encouraged.
- 7 The project is producing a leaflet for local people about CC adaptation. A manual on climate-resilient irrigation would be useful; but some guidance is required.
- 8 Grasshoppers and red snails have caused problems in Prey Veng.

- 9 Inorganic fertilizers are advised against, due to damage to the soil structure - as exemplified in Kratie.
- 10 Pilot activities in the coastal zone (including under CARP) would be useful.

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Cambodia Agricultural Research and Development Institute (CARDI)

25 July 2012 9:00 at CARDI

- 1 Background information was exchanged. CARDI has a staff of around 150.
- 2 Discussion about the interaction between CC impacts and general economic growth, as influenced by the over-all efficiency of production systems.
- 3 CARDI has developed 38 rice varieties, 10 of which are recommended for improved yields in upland fields, intermediate fields and deep water fields.
- 4 CARDI promotes ST varieties for the upland fields, MT for the intermediate fields, and LT for the deepwater fields. None are salt-tolerant; but some have some drought and flood resilience, including the ability to survive being completely submerged for 10 days (3 varieties) and 13 days (2 varieties). One variety is robust to drought; while another (culsa) is robust to attacks by brown planthopper. CARDI has studied crop calendars for farmers exposed to the 'small dry season' in the rainy season (late July to early August).
- 5 Aromatic varieties are more exposed to insects, and so are dry season crops. Brown planthoppers occur typically twice a year (late February to mid March, and mid July to mid August).
- 6 CARDI also works with various other crops, such as soybean, tomato, watermelon and maize.
- 7 CARDI provides guidance to farmers about choice and use of fertilizer.
- 8 Information about soil classification/soil quality is important when learning from one part of the country to another. CARDI's Soil and Water Science Office applies a classification into 11 soil types with different needs of fertilizer. 40% of the agricultural land is sandy (which is poor for cultivation).
- 9 CARDI promotes good practices to communes all over the country. Funding is generally inadequate, however; and the coastal area is not a high priority.
- 10 In general, Cambodia has a big scope for improved rice yield, up to 6 t/ha, given the right seeds and some fertilizer. Farmers can retain the seeds for 3-5 years, then they must buy again.
- 11 Discussion about photo-sensitivity (of aromatic varieties). Some farmers avoid aromatic varieties, because their families will eat more if they grow such delicious kind of rice!
- 12 Other viable crops are mung bean; soy bean; green bean; water melon; and vegetables. Cassava is sustainable if it can be sold for more than 300 riel/kg, otherwise it is not profitable.

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National Committee for Disaster Management (NCDM)

30 July 2012 9:00 at NCDM

- 1 Background information was exchanged. Large-scale floods occurred in 2000, 2001 and 2011; and severe drought in 2004. But many years see flood- and drought-related problems.
- 2 NCDM has 63 staff, all in Phnom Penh. There are de-central disaster management committees at the province, district, commune and village levels, staffed with volunteers.

The structure of NCDM

National level: The Prime minister is chairperson, and other ministers are members.

Province level: The provincial governor is chairperson and other provincial departments and district governor are members.

District level: The district governor is chairperson and other technical officers are members.

Commune level: The commune chief is chairperson and other village leaders, police posts, health centre, and women's affair representatives are members.

By 2010, NCDM has created **village teams**, chaired by the villager chief, and with veterinarians, human health care operators and villagers volunteering as members.

- 3 A law about national disaster management is being drafted. It will retain NCDM directly under the Prime Minister.
- 4 In the past, NCDM collaborated with MRC; but not so much now.
- 5 The Training Department has 6 staff. The department is involved in strengthening the sub-national risk reduction capacity. It collaborates with NGOs and development partners; and works with provinces, districts and communes - including commune-level flood and drought preparedness planning.
- 6 CC training (including inland floods and drought) is among the activities; this is done in collaboration with NGOs; but not in the coastal zone (due to donor preferences). The training aims at preparedness planning and self-management of floods and drought.
- 7 A scope is seen for similar (disaster management/DRR) training in the coastal zone - perhaps covering dykes and canals, and CC implications.
- 8 Drought mitigation is undertaken jointly with MOWRAM (water supplies) and MAFF (seeds).
- 9 There is no collaboration with the private sector.
- 10 Funding is provided by the EU and from various NGOs.
- 11 Maps are not widely used - but some maps are available from MRC.
- 12 A collaboration takes place with ADPC (in Bangkok), for example including training (in 2009) in Prey Nob District, Preah Sihanouk Province, with participation by more than 20 people.
- 13 A general, national CC strategy (for the whole country) is being drafted (2012).
- 14 Sub-national government employees should be able to prepare their own work plans for disaster preparedness/DRR. Capacity-building is need in support of this aim.

Climate Change Department, MOE

30 July 2012 10:30 at CCD

- 1 Background information was exchanged.
- 2 CCD manages 10 + 10 projects under the CCCA framework.
- 3 CCD is involved in activities such as
 - a booklet on aid on climate change and clean development;
 - a book on sustainable energy in Cambodia, in support of planning of clean development;
 - a book on the clean development mechanism; and
 - preparation and support to implementation of the National Adaptation Program of Action (NAPA) to climate change.

*

Department of Natural Resource Assessment and Data Management, MOE

7 August 2012 14:30 at MOE

- 1 Background information was exchanged.
- 2 The GIS office has 10 staff members. It is (almost) operational, except for some uncovered operating costs. funds. It has an A0 printer, donated (with ink!) by Flora & Fauna. Presently, it is out of work, due to want of a bit of O&M, but could be repaired at a moderate cost. The ink comes in sets of 4 boxes at 40 USD per box; paper costs 35 USD per 100 sheets.
- 3 The GIS office works mainly with land use and zoning (including protected forest areas and forest cover).
- 4 In 2005, the office mapped the coastal zone, making a distinction between 3 classes: Mangroves, forests and agriculture. These maps have not been updated since then; an update every 3 years would be appropriate.
- 5 Discussion about the general use of maps, which is important for many ministries. The provinces use their own maps, while the districts and communes use administrative maps only.
- 6 MOE has provided training to the communes, but at a very basic level (use of computers).
- 7 There is some collaboration with MRC, including training and data sharing. Some training was provided in the past by Aruna (a local GIS firm), it went well, but the collaboration has been discontinued due to lack of funds. Apart from this, there is no collaboration with the private sector.
- 8 The GIS Office could produce climate-related thematic maps (such as disaster risk maps) if data were provided; but would need some technical support for the analysis. [There seems to be a considerable potential demand of such maps].
- 9 Training in GIS and data analysis would be welcome.
- 10 The Department of Natural Resources Assessment and Data Management is involved in compilation and publication of the report on National Environmental Conditions. The

department seeks to raise public awareness on trends and conditions related to natural resources and the environment, and to promote better practices among decision-makers.

*

EIA Department, MOE

7 August 2012 15:00 at MOE

- 1 Background information was exchanged.
- 2 The department has 48 staff members. It conducts reviews of EIAs provided by the various developers (and often produced with technical support from consultants contracted by the developers). The review would cover air pollution, water pollution and land use, as relevant from case to case. A service fee is charged for this review.
- 3 An environmental management plan can be a part of the EIA application.
- 4 Also, the department can conduct follow-up monitoring.
- 5 There is a guideline about air pollution.
- 6 Carbon emissions are considered for major land concessions. The department has (unofficially) visited an oil refinery in Quangxi Province, China, that practises carbon retention. There are plans to request factory owners to avoid CO₂ emissions in the future.
- 7 It is a general aim to retain forest vegetation along rivers and around lakes.
- 8 Public participation in the EIA process is encouraged, including submission of comments.
- 9 Where relevant, the EIA review will consider implications of reservoirs - including compensatory tree-planting, possibly elsewhere in the country, provided by MOE or MAFF (depending on who is in charge of the affected area).
- 10 Discussion about the 2011 floods in Thailand and their severe impacts on industrial development zones. Could this happen in Cambodia?
- 11 New factories are typically located '*up front*' by the government, so the location is not included in the EIA. Flood risk and drainage implications are not much considered; but the developer must provide a baseline description (of existing conditions) and explain how to mitigate impacts caused by the development.
- 12 One new factory, in Kratie, was located near the dolphin habitat, but was approved because the highest water level in the river would remain below the ground level of the factory.
- 13 An EIA law is being drafted, with support from Visnu (a local law firm). The time horizon is unknown. This new law could possibly cover climate implications?
- 14 Training in EIA and CC to new officers would be welcome.

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