



Third International Symposium on " Effects of Climate Change on the world's Oceans"

Fisheries Management and Climate Change Responses in Cambodia

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Cambodia

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Kingdom of Cambodia







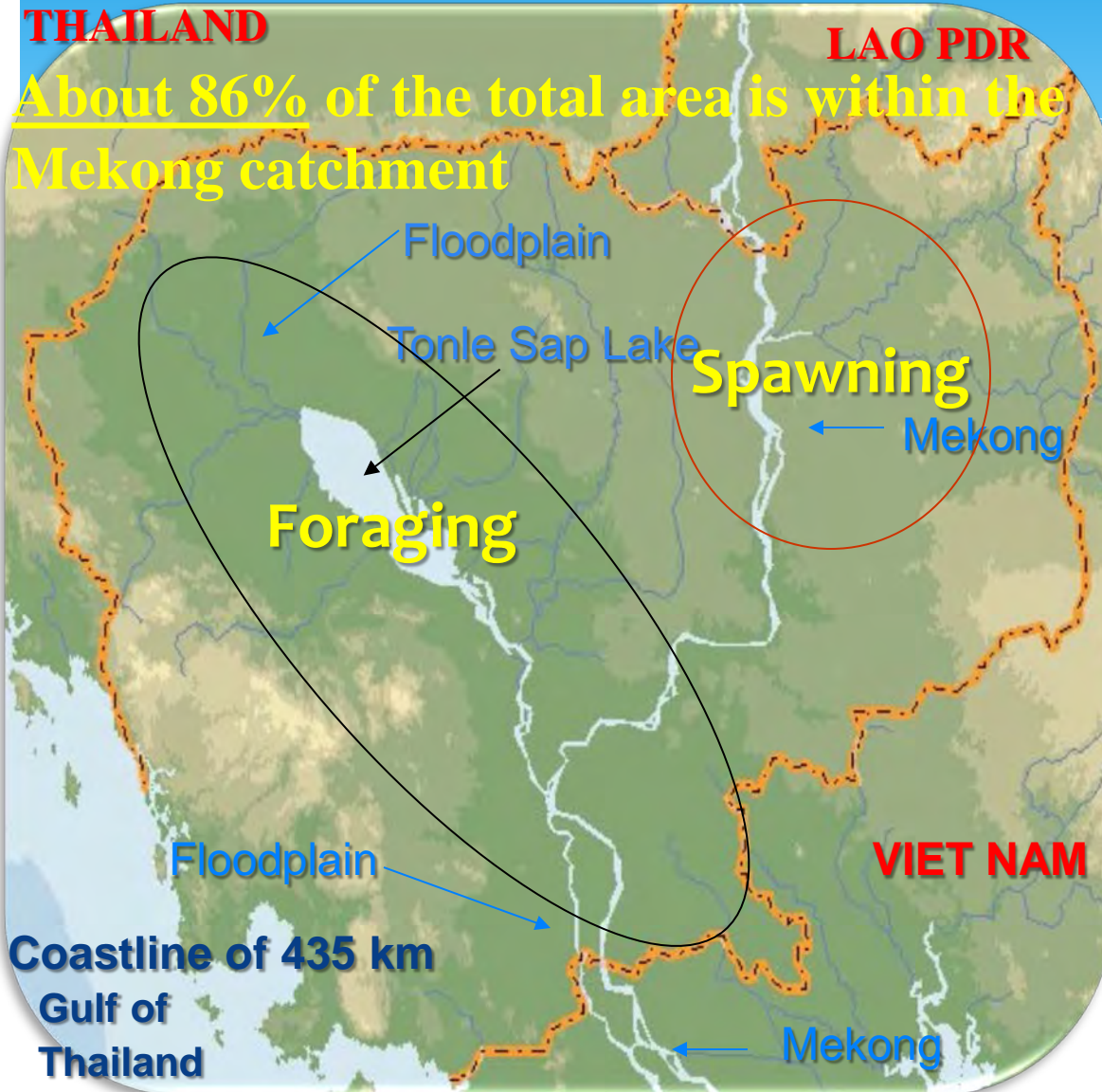
FISHERIES OF CAMBODIA

Cambodia's Inland and Marine Waters

THAILAND

LAO PDR

About 86% of the total area is within the Mekong catchment



- Floodplain: 40,000 km² or 22% of Cambodia = 60% of Mekong
- Flooded forests: 932,141 ha
- Mangrove forests: 67,770 ha
- Tonle Sap: 3,000-15,000 km² or 8%, the largest and most productive lake in SE Asia

High diversity of fisheries resources in Cambodia

- At least 500 fish species recorded in the Cambodia's Mekong River (the Lower Mekong basin encompasses at least 1,200 fish species)
- Tonle Sap Lake hosts 296 fish species ranking third in the world
- Tonle Sap Lake production is > 60% of total fish production



Reptile 42 species



Migratory birds 225 species



Fresh Water Turtle 12 species (7species from GL)



Fresh Water dophin & 2 species of lions from GL



Fresh Water Snake 7 species



Marine fish species: 700 and other marine life

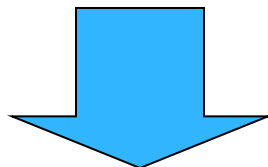


Very Productive Fisheries in Cambodia (2001-2010)

Type of fisheries	Annual catch range (Tones)
1. Freshwater capture fisheries	314,000 – 450,000 (world's 4th) Max. yield (76%)
- Large-scale fisheries	
- Fishing lots	25,000 – 75,000
- Bag net or <i>Dai</i> fishery	14,000 – 30,000
- Medium-scale fisheries	85,000 – 100,000
- Small or family scale fishery	115,000 – 120,000
- Rice field fishery	75,000 – 125,000
2. Marine fisheries	70,000-85,000 (14%)
3. Aquaculture	55,000 - 60,000 (ranked 7th in terms of growth (10%))
<u>Grand Total</u>	<u>439,000 – 595,000 (100%)</u>

Cambodia Fisheries is a major source of nutritious food in the daily diet of the population

- Fish provide up to 81.5% of total animal protein intake for the population, but also important micronutrients such as calcium, iron, vitamin A and vitamin D etc.
- Fish consumption Estimated based on:
 - Official statistical data (Average): 52.4 kg/person/year
 - Household (Tonle Sap and plain region): 67–80 kg/person/year



This rate is in the mid-upper level of world ranges of 16 – 90 kg/person/year.

Cambodia Fisheries Providing Employment Opportunity

- Over 6 million Cambodians = fishing and related fishing activities = 45.5% of the total population around 15 Millions.
 - **Full time fishers = 10.5%**
 - **Part-time fishers = 35.0%**
- Those are:
 - 87% are small-scale fishing
 - 9% medium-scale fishing
 - 4% large-scale fishing

Cambodia Fisheries Generates National Revenue and Contributes Significantly to GDP

- An estimated Value Fisheries = US\$ 1.2 – 1.6 billion.
- This estimated value accounts for about 10-12% of Cambodia's GDP.
- The fisheries accounted for **25%** of the Agriculture GDP, ahead of animal production (**15.5%**), forestry (**6.9%**) & nearly half of rice and crop production (**52.6%**)
- Export: approx. **50,000 tons** to many Asian countries, Australia and USA

Cambodia Fisheries Attract Local and International Tourists as Eco-tourism



**Floating villages in Chong Khneas
and Kampong Phlouk
in Siem Reap**

Mangrove Forests and Coral Reef in Koh Kong (Koh Sdach) and Kompong Som Provinces



Mekong Dolphin at Kampi in Kratie



Fish Refuge Area for Conservation and Eco-tourism



Cambodia Fisheries Having Cultural Values

- Cambodians traditionally and culturally consume fish everyday in one or another forms: Fresh fish, salted-dried fish, salted fish, smoked fish, fish sauce, fermented fish, and especially so-called *prohoc* fish paste.

- *Prohoc* can be produced only from freshwater fish species; if no freshwater fish, no *prohoc* production, resulting in loss of Khmer identity.





Fisheries Management in Cambodia

Vision of the Fisheries Sector

“Management, conservation and development of sustainable fisheries resources to contribute to ensuring people’s food security and to socioeconomic development in order to enhance people’s livelihoods and the nation’s prosperity”

National Strategic Development Plan for the Sector

➤ The Fisheries Reform

- ❖ Cancellation of the fishing lots**
- ❖ Encouragement of the fishing communities in managing the natural resources**
- ❖ Establishment of an efficient fish market mechanism**
- ❖ Strengthening of the national resource conservation**
- ❖ Promotion of aquaculture**

The First Reform of the Fisheries Sector

- ❖ In October 2000, the Royal Government of Cambodia abolished and released about 56.74 % of the total fishing lots area equivalent to 541,206 ha, to be used by the local fishers.
- ❖ Encouraged establishment of CFi's throughout the country for both freshwater and coastal region.
- ❖ Encouraged active participation by local people, local authorities, government institutions, local and international NGOs.

The Second/Deep Reform of the Fisheries Sector

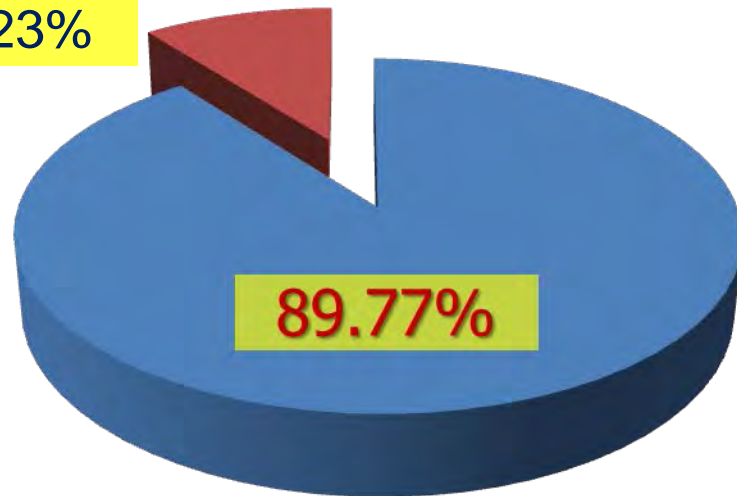
- ❖ In 2012, RGC abolished all remaining 80 fishing lots (415,218 ha):
 - 317,715 ha = 76.50% were handed over to local fishers for their participation and responsibility in management and sustainable utilization of the fishery resources.
 - 97,503 ha = 23.50% were kept as conservation area for the fish brood stock.
- ❖ Allowed family fishing gears were increased in terms of number and length.

Abolished Fishing Lots Status

158 Fishing lots abolished=953,861 ha

97,503 hectares (10.23%) set aside for conservation (national management)

10.23%



856.358 hectares (89.77%) for CFI's (Use and conservation)



Community Based Fisheries Management



Before 2000

Centralization (Top-down management)

After 2000

Fisheries Co-Management

Decentralization and Deconcentration

Community Based Fisheries Resources Management

Fisheries Resources Conservation and Protection

- * Dissemination of the significance of fisheries habitat to communities**
- * Replanting of flooded forest and mangrove**
- * Improvement of the Marine Fisheries management Area**
- * Improvement of new fisheries conservation areas released from fishing lots**
- * Protection of endangered species**
- * Management of Great Lake conservation area**
- * Establishment of community fish refuge in Inland and Marine areas**
- * Conservation of freshwater biodiversity in deep pools....etc....**

Management Plan for the Marine Fisheries Management Areas (2014-2019)

- ***Vision:*** A model marine fisheries management area for conservation of marine biodiversity, sustainable fishing and tourism, contributing to poverty reduction

* **Goal 1:** [BIOPHYSICAL] Marine biological diversity sustainably protected and restored

* **Goal 2:** [SOCIOECONOMIC] Livelihood and food security of local community and relevant stakeholders enhanced and diversified

* **Goal 3:** [GOVERNANCE] Management model established and strengthened, and legal framework effectively implemented

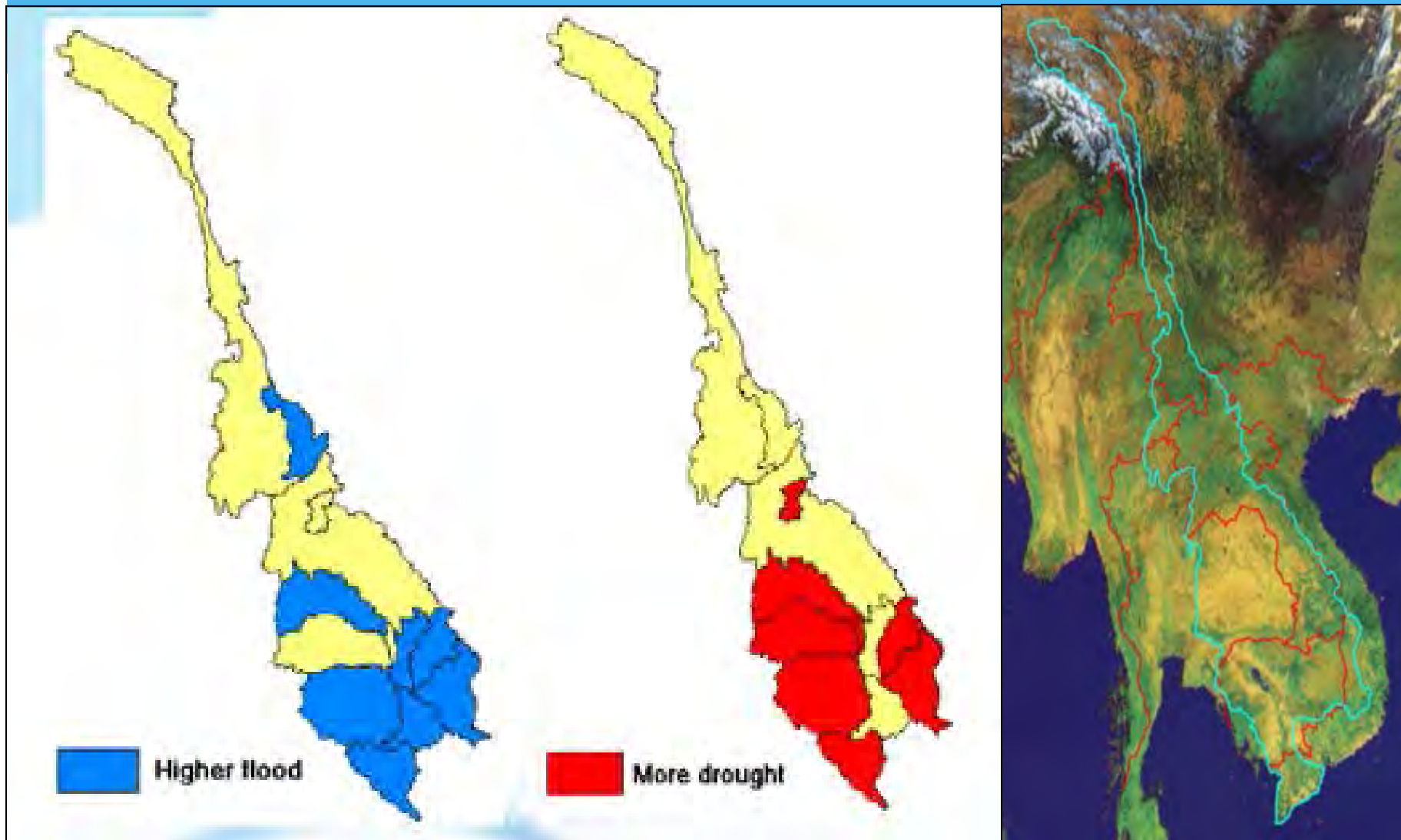
**Is climate change occurring in
Cambodia?**

Yes

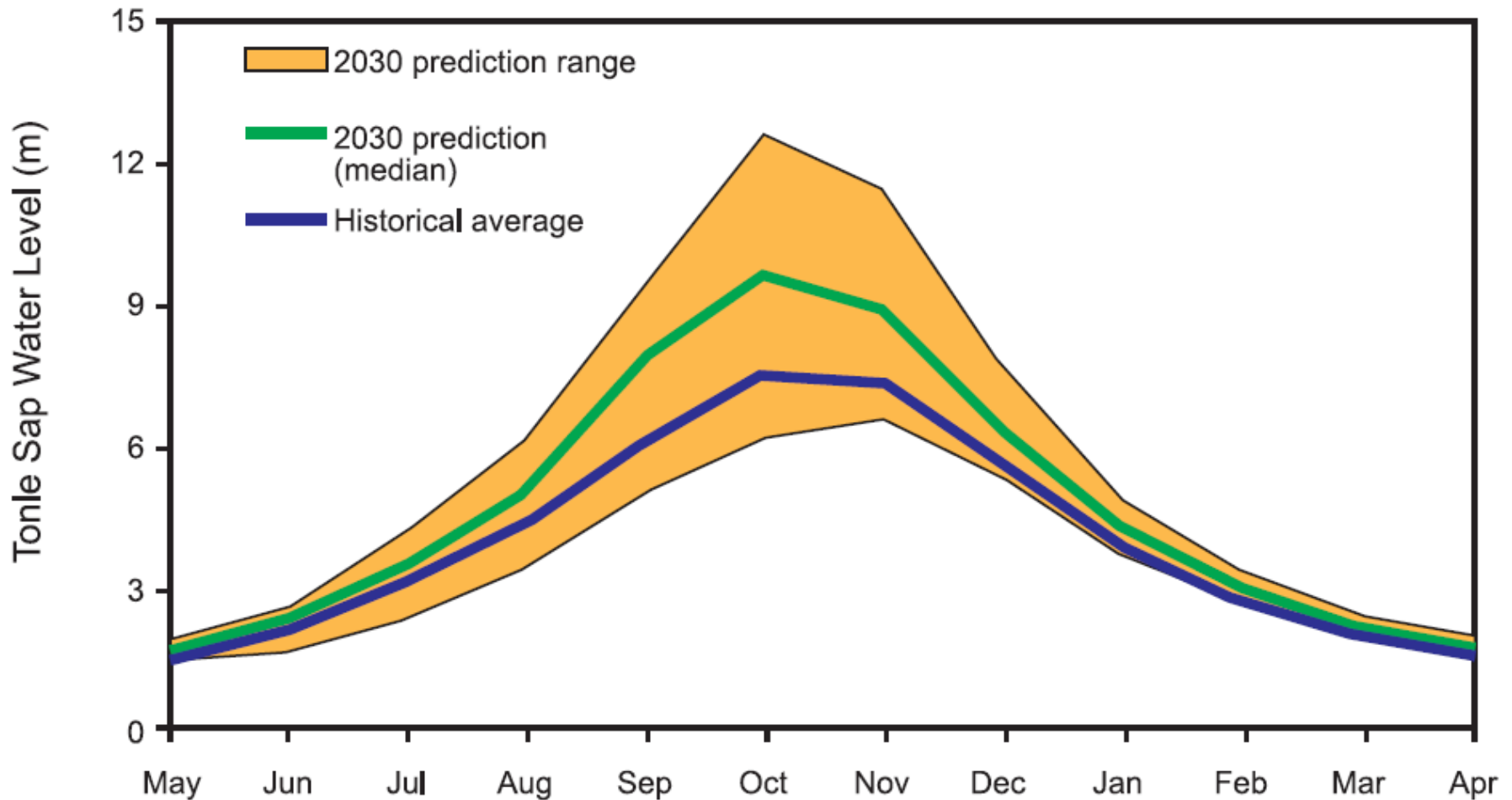
Overview of Climate Change in Cambodia

Factor	Change predicted	Remark
Temperature	+0.8 °C since 1960 +0.3 to +0.6 °C by 2025 + 0.7 to 2.7 °C by 2060	Climate change occurring in Cambodia; more severe in Dec-Jun
Rainfall in Wet Season	+3 to 35%	- Uncertain change; more in the lowlands than highlands - More flooding
Rainfall in Dry Season	unchanged or lower	
Extreme events	More frequent and more intense	Storms, heat wave, Floods, and droughts
Runoff	+21%	More sediment load in water/lakes impact on water /fish productivity
TS level in WS	+2.3 m	Higher flood levels
TS level in DS	+0.1	Higher water level

Mekong River and Cambodia



Historical (1951-2000) and future (2030) seasonal fluctuation in water level in Tonle Sap Lake, Cambodia



Climate Change Risk & Impacts to Fisheries Sector

Source: WorldFish Center *Climate Change and fisheries: vulnerability and adaptation in Cambodia, 2009*

Possible Impacts on

Impact on fisheries resources & its Env't

Impact on Socio-economic

Impact on livelihood and food security
and nutrition of people

Climate Change Impacts on Fisheries Resources

Predict Change Factor	Potential Impacts
Increase in water temperatures (+0.3 – +0.6 C) by 2025	<ul style="list-style-type: none">- shallower reservoirs , lake, and canals- Decrease Dissolved Oxygen- Decrease feeding ground- Slow fish grow rate- Lost spawning ground- Least fish species and diversity- Decrease Fish Stock
Rainfall in WS expect to increase (+3 to +35%) GL level expect to increase up to 2.3 m	<ul style="list-style-type: none">- Positive sign for Fisheries resources because more flooding, more habitats for fish spawning, nursing, foraging,- but its still impact to fisheries resources due to the dam development which impact for fish migration to spawn at upper Mekong.

Predict Change Factor

Runoff throughout the Mekong Basin is expected to increase by about 21%

Potential Impacts

- Increasing sediment loading in rivers, lakes and wetlands, with higher nutrient levels boosting fisheries productivity. But,
- The effect may be offset by sediment retention behind the many dams that are likely to be constructed upstream



Predict Change Factor

Potential Impacts

Extreme weather events (Storms, floods and droughts)

- Loss of aquaculture stocks and wild fish stocks/habitats
- Destroyed fishing and aquaculture infrastructure
- Higher direct risk to fishers
- Change in fishery production are likely to reduce fish production
- Likely to have the greatest impact on people who depend on fishing as their primary livelihood activity

Rising sea level

- Salt water infusion into inland and ground waters causing:
 - Damage to freshwater capture fisheries
 - Reduced freshwater availability for aquaculture
 - shift to brackish water species (high value species, e.g. seas bass, mud crab, black tiger shrimp)
 - Loss of coastal ecosystems such as mangrove forests:
 - Reduced recruitment and stocks for capture fisheries and seed for aquaculture.
 - Worsened exposure to waves and storm surges
 - Risk that inland aquaculture and fisheries become inundated.

Predict Change Factor

Potential Impacts on Socio-Economic

Extreme Events such as Storms, heat wave, floods, and droughts

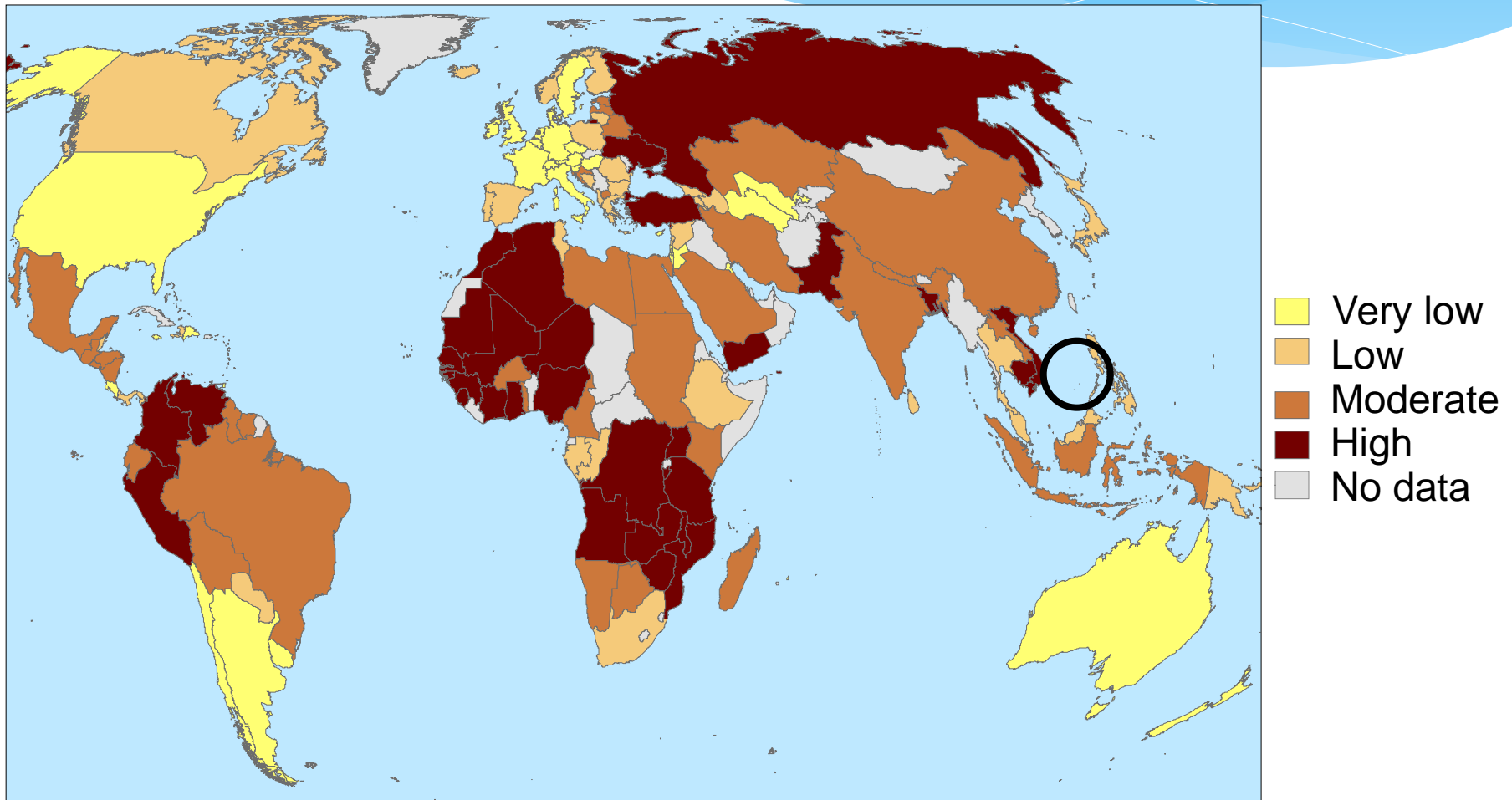
It occur frequency, long and intensity causes to:

- Decrease of the fisheries contribution to national budget
- Loss of job and livelihood opportunity cause to get less income for family especially for poor family and vulnerable people.
- Increase the budget expanse from gov't to support

Potential Impacts on Livelihood and Food Securities and Nutrition

- Destroyed of public infrastructure and housing
- destroyed of agriculture product and production
- lack of daily food consumption and nutrition
- Poor people face to high risk disaster
- loss of opportunity for children go to school
- loss of opportunity to find job
- Need strong support and intervention from gov't, NGOs, RED Cross and other private sector help.

Out of 132 countries, Cambodia (30), whose fisheries is most vulnerable to CC





**GOVERNMENT RESPONSES TO
CLIMATE CHANGE IMPACTS IN THE
FISHERIES SECTOR**

FiA-CCSP

- * **Vision:** *Responsible Climate Change mitigation and adaptation measurement for Sustainable fisheries resources management to increase fisheries productivity, fish stock and aquatic resources ensure food and nutrition security and contributing to poverty alleviation.*

FiA-CCSP

- * **Mission:** *FiA will lead the sector in developing necessary adaptation measures to ensure adequate resilience to the effects of climate change, and will put in place the necessary mitigation measures to minimize the sector's contribution to the cause of climate change.*

FiA-CCSP

- * **Goal:** *To Promote development and effective management of fisheries in response to climate change with particular focus on improvement of aquatic ecosystems, prevention of flooded and mangrove forest destruction, promotion of research study and development of aquaculture and processing as well as strengthening more effective community fisheries (CFi) management; and*

FiA-CCSP

* Objectives:

1. To develop and maintain a clear understanding of the way in which climate changes are likely to impact of all parts of the sector,
2. To put in place adaptation measures which adequately ensure the sustainable management of fisheries resources in such a way as they continue to support the dependence of Cambodia's population on these resources,
3. To participate actively, on a regional basis, to ensure that all measures taken to adapt to the affects of climate change are fully integrated with:
 - Other measures taken to support fisheries in Cambodia
 - Other measures taken by neighbouring countries

FiA-CCNAP

- **Strategic Objectives:** *To promote sustainable management and development and conservation of fisheries by strengthening awareness and capacity on climate change, appropriate actions to adapt to and mitigate climate change and active contribution to climate change initiatives at all levels, particularly at the local, national and the Mekong regional levels.*

Strategy 1

- ***Strategy 1: Improving fisheries productivity and production to ensure food security, promote nutrition and income generation through strengthening the management, promotion of development and conservation of fisheries resources; increase overall aquaculture production by 15% annually; promote the creation and management of community fish refuge by 75% of all communes nation-wide by 2019***

S1-Activities

- **Key Activities 1:** Promoting aquaculture production systems and practices that are more adaptive to climate change
 - Identifying and testing climate resilient aquaculture practices
- **Key Activities 2:** Increasing the resilience of wild fisheries resources to climate change impacts
 - Building CC Resilience capacity of Community Fisheries for effective fisheries management
- **Key Activities 3:** Promoting CC resilience livelihood diversification in CFI
 - Identifying, demonstrating and scaling out climate resilient livelihood options with in Mekong, Tonlesap and Coastal Region

Strategy 2

- **Strategy 2:** *Understanding the effects and impacts of climate change on the fisheries resources and aquaculture nationwide and developing and implementing climate change adaptation and mitigation strategy for the fisheries sector;*
- **Key Activities 1:** Improving understanding of the climate change impacts and vulnerability of fisheries sector in order to enhance the monitoring and planning
 - Conducting an assessment of climate change impacts on and vulnerability of Fisheries Sector throughout its value chain.
 - Developing a set of indicators and protocols for monitoring climate change implications in fisheries sector

Strategy 3

- ***Strategy 3: Enhancing the fish and fisheries product safety by ensuring at least 80% of processors comply with and 80% of fish and fisheries products are produced under the rules and regulation of food safety and quality assurance and standard by the end of 2018.***

S3-Activity

- **Key Activities 1:** *Strengthening the entire value chain for the fish and fisheries products to response to the climate change and Developing climate resilience technologies to improve quality of fishery products in the fishery processing industries*

- *Identifying and testing the climate sensitive and socially acceptable post-harvest technologies*

- *Disseminating climate sensitive post-harvest technologies to relevant stakeholders*

Strategy 4

- **Strategy 4:** Promoting establishment of Fisheries One Village One Product (*FOVOP*) to improve local fisher livelihood and wellbeing to enable their adaptation to and contribution to mitigating climate change by establishing FOVOP in at least 150 communities by 2018
- **Key Activities 1:** Promoting and Mapping climate resilience FOVOP
 - Promoting and Mapping climate resilience FOVOP

Strategy 5

- **Strategy 5:** *Strengthening research study, development and dissemination of new techniques on climate sensitive and fish growing species for breeding, rearing, feed production, and new fish product processing technologies to meet the need of the market economy*

- **Key Activities 1:** *Improving research and modeling capacity for climate change impact assessment on fisheries sector*

- *Conducting studies to identify aquatic species, breeding, and feeding technologies that are more resilient to climate change impacts*

Strategy 6

- ***Strategy 6: Strengthen and enhance capacity of responsible agencies and stakeholders to coordinate interventions and develop human resource through provision of training on effects of climate change in fisheries and relevant adaptation measures***

S6-Activity

- **Key Activities 1:** *Developing capacity and awareness for climate change and appropriate responses in fisheries sector*

- Conducting capacity building for fisheries officers (impacts assessment and GHG inventory and others...) and awareness raising for other fisheries stakeholders.

- **Key Activities 2:** Enhancing institutional coordination and cooperation at national, regional and international

- Establishing network for information and knowledge sharing with NGOs, IOs, DPs and governmental technical working group on fisheries and other regional organization like ASEAN, MRC... etc.;

Strategy 7

- *Strategy 7: Strengthening effective management and preservation of flooded and mangrove forests and their replanting in degraded areas; by the end of 2019.*

S7-Activity

- **Key Activities 1:** *Strengthening existing management and conservation of key habitats to contribute to carbon sink and improve adaptation responses.*
 - *Establishing and Conducting Green House Gas (GHG) inventory in Fisheries Sector (Carbon sink and sources calculation).*
 - *Promoting REDD+ implementation in Fisheries Sector (including carbon credit)*
 - *Developing an effective management plan for the flooded and mangrove forests, sea grass and coral reefs to enhance carbon sink*

Strategy 8

- **Strategy 8:** *Promote adoption and enforcement of policy, legislation and regulation and raise technical and scientific based awareness knowledge among relevant stakeholders such as fishers and fish farmers, fish processors, and politicians;*
- **Key Activities 1:** *Integrating the climate change adaptation and mitigation (GHG) strategies into the Fisheries Development Plan and National Strategic Development Plan*
 - Integrating climate change adaptation into existing plans and legislations in fisheries sector

Strategy 9

- **Strategy 9:** *Promote environmental and ecosystem protection through control on discharge of waste from fishing boats, and destruction and burning of, encroachment into, and utilization of flooded and mangrove forests for fish processing, and water pollution as a means to contribute to reducing greenhouse gas emissions in the fisheries sector*
- **Key Activities 1:** Enhance environmental quality in Fisheries values chain and processing
 - Mapping the potential pollution by fisheries industries and activities

Strategy 10

- **Strategy 10:** *Promote gender in adaptation to and mitigation of climate change impact in the fisheries sector*
- **Key Activities 1:** *Promoting gender awareness of the climate change impacts and responses in fisheries sector*
 - Developing materials suitable for different media and capacity-development programs to promote understanding of gender issues in both adaptation and mitigation to/of climate change

FiA-CC Progress and Way Forwards

- Need to integrate and implementations of CCSP & CCNAP into the FiA-FSP 10 years
- Start to implement of CC by 2014 through out most activities:
 1. Capacity Building to FiA officer at national - sub-national and CFi level for ToT and other stakeholder including women
 2. scale up of some adaptation activities has been achieved with the pilot demonstration of the project CCCA
 3. Conducting some assessment on the climate change impact and vulnerability in fisheries and aquaculture with some modeling capacity to identified the resilience of seed, feed, technology.
- Enhancing institutional coordination and cooperation at national, regional and international with DPs, other stakeholders to implementation FiA-CCNAP



CONCLUSION

1. Fisheries in Cambodia are very diversified and productive and played very important role for livelihoods and main source of protein up to 80% of animal protein intake, but highly variable by nature and subject to environment change, including climate change.

2. Hydropower and irrigation dam construction, intensified fishing pressure and macro-economic drivers are likely to affect Cambodia fisheries more immediately and visibly than climate change.

3. Building fishers communities capacity to adapt to these immediate changes goes hand-in-hand with improving capacity to adapt to climate change, are very vital.

4. A far-reaching strategy to improve adaptive capacity and strengthen resilience promises to reduce poverty and enhance fish food security now and in the future.



INCREASING TEMPERATURE
កំណើនសីតុណ្ហភាព



DROUGHT
ព្រោះរាំងស្ងួត



FLOOD
ព្រោះទឹកជំនន់



RISING SEA LEVEL
កំណើនកំពស់ទឹកសមុទ្រ

ការសិក្សាបង្ហាញថា ការប្រែប្រួលអាកាសធាតុ និងផ្ទះបង្គោលអាកាសធាតុនៅក្នុងសីតុណ្ហភាព ចេញប្រកាសនៅឆ្នាំ ២០១០ ផលវិបាកនៃការប្រែប្រួលអាកាសធាតុនឹងរួមមាន៖

- សីតុណ្ហភាពមធ្យម និងកើន ០.៤ អង្សាសេស្យែន
- ព្រោះរាំងស្ងួត និងទឹកជំនន់ខ្លាំងកាន់តែច្រើន និងប៉ះពាល់ដល់ផលិតផលកសិកម្ម និងផលរុក្ខជាតិ
- កំណើនកំពស់ទឹកសមុទ្រ នៅលើសមុទ្រចេញនៅប្រទេសសៀមធានាភាពខាងត្បូង។



Thank You Very Much !!!

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