



Etude des risques et vulnérabilités au changement climatique dans les pays de la COI
et ébauche d'un plan d'action régional d'adaptation- PARA
dans le cadre du programme ACCLIMATE de la COI



Groupement ASCONIT Consultants- PARETO



ATELIER NATIONAL SEYCHELLES

VULNERABILITE ET ADAPTATION AU CHANGEMENT CLIMATIQUE

SFA Training room, 1^{er} février 2011

Etude co-financée par FFEM, MAEE, Région Réunion





8.30am	Opening remarks (NCCC co-chairperson Mr. Antoine Marie Moustache)
8.45– 9.15am	Presentation of the workshop objectives and agenda, and methodology for the study of vulnerability (National consultant & sector consultant)
9.15–9.30am	Preparation and setting up of groups & tasks
9.30-10.00am	<i>Coffee break</i>
10.00–11.30am	Group work (3 groups)
11.30-12.15pm	Presentation of group work (15min per group)
12.15-12.30pm	Synthesis of common challenges and recommendations for country's orientations of the regional strategy, the findings of the workshop
12.30-1.30pm	<i>LUNCH</i>



- ❑ **Le projet ACCLIMATE, lancé en 2008, vise à soutenir une coopération régionale structurée en faveur de l'adaptation au changement climatique, et le renforcement des capacités de la COI, pour ses pays membres, Union des SEYCHELLES, Maurice, Madagascar, Seychelles et Réunion.**
- ❑ Notre mission : lancée en novembre 2010, l'étude doit aboutir à la formulation d'un document de politique générale pour la stratégie régionale d'adaptation pour la COI, pour mars 2011.
- ❑ Un atelier national est organisé simultanément dans chacun des pays membres : il permet de co-construire, avec les personnes ressources dans chaque pays, le bilan vulnérabilité et inventaire des mesures d'adaptation du pays.

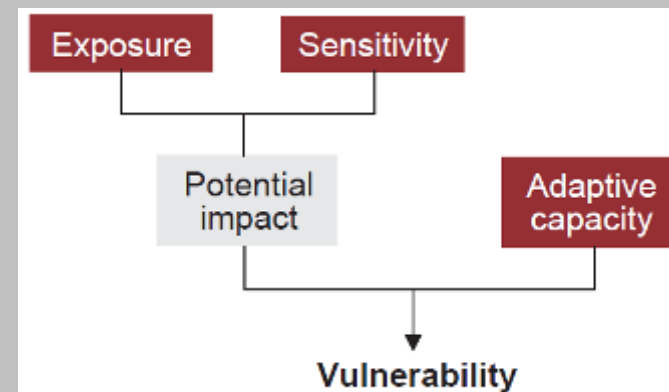


- Objectif de l'atelier national
 - **Inscrire la réalisation de cette étude dans un processus participatif dans chaque pays membre,**
 - pour faire participer le plus largement possible dans la phase d'analyse et de construction du bilan par pays,
 - et pour faciliter l'appropriation des résultats et recommandations qui sont issues de l'étude et concerneront l'ensemble des pays membres de la COI.
 - **Produire 4 types de contribution dans cet atelier**
 - Apporter des compléments aux éléments d'analyse vulnérabilité et initiatives d'adaptation du pays
 - Formuler les défis prioritaires du pays en matière d'adaptation au Changement climatique
 - Identifier les manques et besoin d'appuis complémentaires pour répondre aux enjeux de la stratégie nationale d'adaptation au CC
 - Formuler des propositions, pistes de réflexion, questions ou recommandations pour les orientations de la stratégie régionale d'adaptation à l'échelle de la COI (en complément ou renforcement des stratégies nationales d'adaptation)



Qualification of vulnerability :

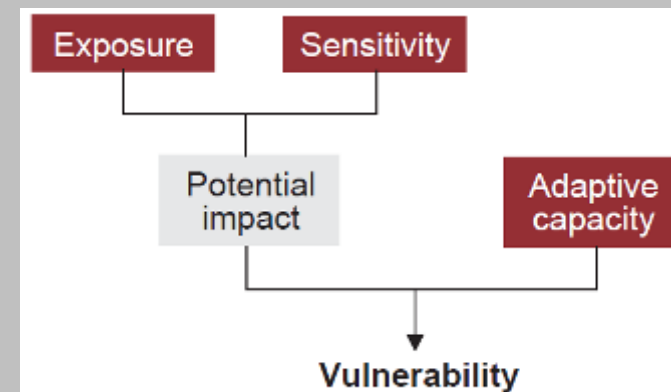
- **Climate change hazard exposure** :List of hazard (and intensity/quantification with available data and prediction : IPCC or Seychelles predictions)
- **Sensitivity and impact** : depending pressures, stress and exposure to hazards
- **Resilience and human adaptative action**





Hazards :

- Temperature
- Sea Level
- Rainfall
- Wind
- Shift in season
- Cyclone
- Ocean acidification
- Other indirect (invasives species, diseases, fires)





Defining intensity of sensitivity

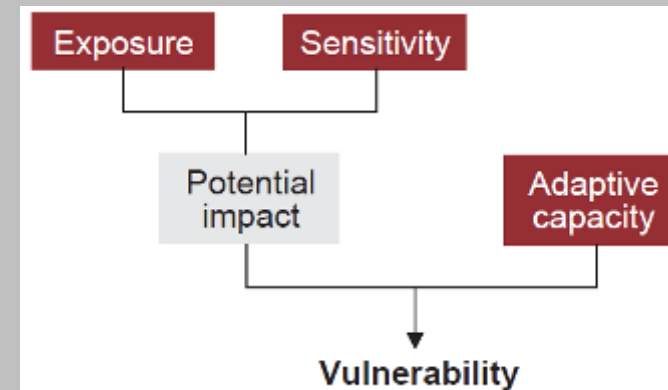
Appréciation qualitative de la sensibilité	
Faible	Pas ou peu de perturbation du système
Moyenne	Le système est affecté dans ses fonctions mais pas dans sa structure
Forte	Les fonctions sont fortement affectées et le système est mis en danger (avec disparition du système si le seuil est atteint)

Defining intensity of potential impact :

Hazards exposure + sensitivity = potential impact (low, medium, high)

(Ex : Increase temperature + coral reef sensitivity

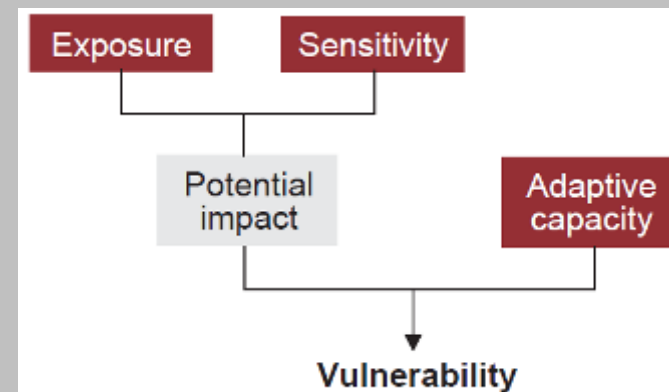
= high impact (bleaching)





Defining present capacity of adaptation (with planified project and action)

- **Resilience** (ex : resilience of forest to invasives species : low) ;
- **Adaptative action** (ex : Forest reserve, ...) and **policy** (Ex: environmental Management Plan include climate change adaptation).





Adaptation concept

« l'ajustement des systèmes naturels ou humains en réponse à des stimuli climatiques ou à leurs effets, afin d'atténuer les effets néfastes ou d'exploiter des opportunités bénéfiques ». (GIEC)

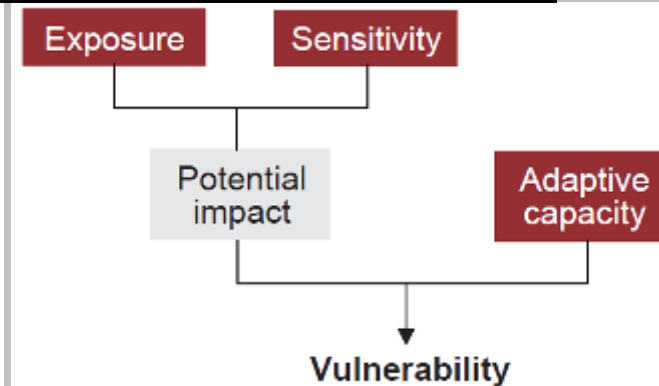
- **Les mesures d'abandon**, notamment des actions d'évacuation des habitants des zones vulnérables ou touchées, ou l'abandon d'une activité ;
- **Les mesures de protection** – et notamment des actions visant à protéger la zone ou l'activité vulnérable contre les effets du changement climatique, ces mesures réduisent le niveau d'exposition et la vulnérabilité ;
- **L'ajustement** qui va permettre de réduire la sensibilité du système et/ou de renforcer ses capacités d'adaptation, renforcer sa résilience.



Example : Define vulnerability for coastal fisheries

1. ENJEUX		2. EXPOSITION			3. SENSIBILITE/IMPACT	4. CAPACITE D'ADAPTATION		5. VULNERABILITE	
Secteurs	Sous secteurs	Risques à prendre en compte	Stress généré		Appréciation	Capacité intrinsèque (resilience)	Capacité extérieure au système, opportunité	Appréciation	Niveau de Fiabilité
		1 Température, 2 Niveau de la mer, 3 Précipitations, 4 Vents, 5 Modification des fondamentaux environnementaux (saisons...), 6 Cyclone, 7 Acidification des océans, 8 effets indirects (que	effet direct et ampleur	effet indirect et ampleur	LOW, MEDIUM, HIGH	LOW, MEDIUM, HIGH	LOW, MEDIUM, HIGH	LOW, MEDIUM, HIGH	de l'appréciation finale de la vulnérabilité, au regard de la validité des données : - fiabilité partielle à totale
Secteur 7	Pêche								
Sous sect 2	Pêche traditionnelle et cueillette	- Temperature, - Cyclone - Seasonal shift, - Ocean acidification, - Other (invasive species, diseases)	- Bleaching - Decrease coral cover - Decrease biodiversity coral and associated fauna and flora. - Mortality & disease = Decrease in abundance, biodiversity of economic fish	Decrease in CPUE	HIGH	LOW : - Up welling, current, cloud..., - Zooxanthelle clades - Shift in coral and fish community	LOW-MEDIUM : - AMP, - Aquaculture, - policies, - shift in targetfish, gear, seasonal fisherie ... - Retraining	HIGH	GOOD

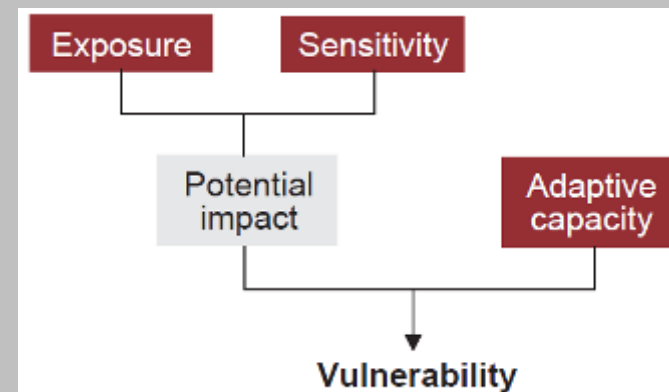
	Sensibilité		
	Faible : 1	Moyenne : 2	Forte : 3
Capacité d'adaptation			
Faible : 3	3 Priorité 2	6 Priorité 1	9 Priorité 1
Moyenne : 2	2 Priorité 3	4 Priorité 2	6 Priorité 1
Forte : 1	1 Priorité 3	2 Priorité 3	3 Priorité 2





□ . Sectors (or systems) used in this study :

- Security and sovereignty
- Cultural identity and education
- Public health
- Integrated water resources management and water cycle
- Agriculture, food security and forestry
- Ecosystems
- Fisheries
- Land planning, infrastructure and risk management
- Energy (production, transfer, distribution)
- Transportation
- Manufacturing, trade and services
- Tourism





- **Objectives of the group work**
 - **Complete the matrix, focusing on the sectors you have been given. List any other useful sources of information and data.**
 - **For each sector, list any practical, feasible adaptation activities that could be implemented in Seychelles (also highlight any limitations).**
 - **List recommendations for regional adaptation strategies for each sector that could be considered by the COI**



- **Fonctionnement des 3 sous groupes**
 - **Small groups of 10 people or less**
 - **Each group focuses on designated sectors**
 - **Choose a chairperson and a rapporteur**
 - **Groups have 1 ½ hrs to complete their task!**
 - **Make sure everyone is involved. Take notes on paper or laptop.**
 - **Each group will have 15min to report**
 - **Followed by discussion, debate and a common sythesis**



Sectors to cover by each group:

- 1. Agriculture, food security**
- 2. Fisheries**
- 3. Integrated water resource management**
- 4. Public health**
- 5. Ecosystems (biodiversity, marine, terrestrial, wetlands, forests, etc.)**
- 6. Land use planning (infrastructure, energy, transport, trade, etc.)**
- 7. Tourism**



□ Example: Agriculture, food security

*HAZARDS TO CHOOSE FROM: TEMPERATURE, SEA-LEVEL RISE, RAINFALL, WIND, SHIFT IN SEASONS, CYCLONE, OCEAN ACIDIFICATION, INDIRECT HAZARDS (FIRE, DISEASE, PESTS, INVASIVE SPECIES)

SUB-SECTORS	EXPOSURE TO CLIMATE CHANGE HAZARDS			SENSITIVITY	ADAPTATION CAPACITY		VULNERABILITY	
	HAZARDS *	DIRECT EFFECTS	INDIRECT EFFECTS	HIGH/MED /LO	INTRINSIC	EXTRINSIC	HIGH/MED /LO	CONFIDENCE GOOD/BAD
Intensive agriculture								
Subsistence agriculture								
Forestry plantations								
Livestock								



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Report from GROUP ONE: AGRICULTURE AND FISHERIES



AGRICULTURE - five subsectors were considered – some were additions to the COI subsectors (those dealing with food imports and storage/distribution).

- In terms of food production, both crops and livestock, the sector is highly sensitive to multiple climate change hazards.
- There is a high level of commitment at government and farm level to implement adaptation measures but an extreme shortage of financial resources. An insurance scheme is being finalized but investment is needed in terms of equipment for adapting to heavy winds and rain, drought, and research into more climate adaptable crops and breeds.
- Heavy reliance on food imports makes Seychelles vulnerable to CC hazards experienced by other food producing countries.
- Storage facilities for food imports (and locally produced food) in Seychelles are not at all “climate-proof” and require upgrading/ re-thinking
- Many families do home gardening – this could be emphasized more in education campaigns
- **IDEAS FOR REGIONAL ADAPTATION PROJECT: sharing of experiences, networking, regional insurance scheme, microloans for farmers to purchase equipment**

FISHERIES - Only two subsectors were examined: commercial and artisanal fishing. Mariculture is not yet developed in Seychelles although there are several projects planned.

- Commercial fishing was rated as highly vulnerable to CC in terms of high sensitivity to multiple CC hazards and few adaptation measures currently in place. Adaptation measures could include development of mariculture as well as exploration of other target fish species.
- Artisanal fishing was also rated as highly vulnerable overall in terms of low / nonexistent adaptation measures currently in place and high sensitivity to CC hazards and habitat degradation
- CC has not been integrated directly into any species management plans though it is a consideration at national policy level
- **IDEAS FOR REGIONAL ADAPTATION PROJECT: sharing experiences and information, mainstreaming CC into management plans, mariculture, investment / microloans for mariculture projects or for fishermen to buy equipment to target different species**



PUBLIC HEALTH- Three main subsectors were considered –vector diseases , respiratory/cardiac diseases and malnutrition.

- Overall, the sector was considered to be have a medium level of vulnerability in Seychelles. Quite a lot of work has already been done in the sector in terms of public education campaigns related to vector control, especially during times of heavy rain.
- Malnutrition is not really a major problem in Seychelles but linkages with home gardening/ the agriculture section were identified.
- On a national level, more education campaigns are called for as well as improvements in monitoring diseases, control of vectors, and coordinating traveller health programs and border control
- IDEAS FOR REGIONAL ADAPTATION PROJECT: Capacity building, share data and technology, and possibly the development of a regional health agency**

WATER- three subsectors were examined: water quality/quantity, production/distribution and water treatment/sewage

- Overall , the sector was gauged to be highly vulnerable in terms of high sensitivity particularly to changing rainfall patterns (increased periods of drought and heavy rain), and current low level of adaptation measures in place. There is a high level of national awareness about the water supply problem and several initiatives in place to try and start addressing the problem.
- Key issues are water supply, but also home septic systems which can be affected by landslides and heavy rains
- Ideas for adaptation at national level included increasing the current conservation campaigns, improve sewage systems, increase water storage, reuse waste water, and using desalination and other water sources
- IDEAS FOR REGIONAL ADAPTATION PROJECT: Capacity building, share experiences, share data**



ECOSYSTEMS: The group considered four main subsectors: terrestrial forest, coastal areas (mangroves, reef, seagrass), atolls, wetlands and biodiversity in general.

□ Overall, the group had some trouble quantifying the vulnerability level for each of the subsectors since the value of ecosystem services was not given a dollar value – it seemed to be easier to quantify vulnerability for sectors more closely aligned to the national economy. The overall rating given by the group to most of the subsectors was medium vulnerability in terms of sensitivity to climate change impacts, intrinsic resilience and current adaptation efforts, but after discussion in the plenary sensitivity was revised High for most sectors in recognition of ecosystem services provided by biodiversity and habitats to the economy; and well being of people in the country. For example, the sensitivity of our forests to cc indirect hazards like forest fire and the potential devastating impact fire would have on the water supply (for example) and economy. Similarly, marine ecosystems are highly tied to the tourism and fisheries industries and their further degradation due to cc would have severe economic implications.

□ Policies generally exist for the protection of biodiversity and more specific ecosystem services however implementation of the policies and law enforcement is viewed as poor. Few adaptation activities are currently in place other than some forest replanting, and small projects to protect and enhance coastal mangroves.

□ On a national level, the group suggested : more public education campaigns (regarding fire and invasive species), projects to protect ecosystems and biodiversity, enforcement of policies and laws needs to be strengthened to ensure that development does not undermine ecosystems, improve research & development, build capacity of specialists living in the Seychelles (not always importing specialists on short term basis). It was noted that education within the formal primary and secondary education system is good with respect to ecosystems and climate change issues. Development of Ecology, Biology and Environmental studies is required at the tertiary level.

□ **IDEAS FOR REGIONAL ADAPTATION PROJECT:** Regional exchange of information, capacity building of local people working in biodiversity research & ecosystem restoration, and funding to keep current projects going



LAND USE PLANNING: Seven main subsectors were considered –Building , Infrastructure (roads, bridges, etc.), Large infrastructure (port, airport), banking & insurance, Energy , Transport and Industry / commerce

□All of these sectors were treated as one group as in Seychelles they are all activities which take place in the narrow coastal strip. The sector was given an overall med/high rating for vulnerability in recognition that while it is very sensitive to cc hazards, quite a lot of groundwork has been done to prepare for adaptation measures.

□Overall, on a national level there is a very high level of awareness of the sensitivity of these activities/ sectors in the coastal zone to multiple hazards presented by climate change – but particularly sea level rise.

□Many plans and policies exist but on a national level, Seychelles needs to put more emphasis on coordinating and implementing existing guidelines/laws for development in the coastal zone, such as the town and Country Planning Act, Rivers Act, Environmental Protection Act etc.

□**IDEAS FOR REGIONAL ADAPTATION PROJECT: Enforcement of legislations, capacity building and education and awareness**

TOURISM three subsectors were examined: Tourism, ecotourism, outdoor sports/leisure activities and business cultural / tourism

□All tourism in Seychelles was considered under one umbrella (a low level of “mass” tourism), and it was acknowledged that tourism shares strong links with the ecosystem, water management, agriculture and public health sectors in particular.

□Ideas for adaptation at the national level included diversifying the current strategies to investigate cultural and business tourism – sectors that rely less on pristine forests and coral reefs that may be subject to degradation due to cc hazards.

□**IDEAS FOR REGIONAL ADAPTATION PROJECT: Capacity building, sharing experiences – particularly with regard to cultural tourism, ie. Mauritius has done a lot in this area**



SEYCHELLES– SUMMARY OF ADAPTATION IDEAS

SECTOR	VULNERABILITY	NATIONAL ADAPTATION IDEAS	REGIONAL ADAPTATION IDEAS
AGRICULTURE	HIGH	Loans for farmers, research on new crops, education campaigns for home gardeners/public to increase consumption of local resistant crops / improve storage facilities	Regional insurance scheme, microloans for equipment, networking and research collaboration on new crops/breeds that are CC resistant
FISHERIES	HIGH	Mariculture projects, retraining of fisherfolk	Mariculture –sharing experience, networking, microloans for farmers, research on cc effects on species
PUBLIC HEALTH	MED	Education campaigns, improve monitoring of disease, control rodents and mosquitoes, border control, traveller health program	Capacity building, share data and technology Regional health agency
WATER	HIGH	Conservation campaign, improve sewage systems, increase water storage, reuse waste water, use desalination and other water sources	Capacity building, share experiences, share data
ECOSYSTEMS *take into account ecosystem services and review this sector	MED? MED/HIGH? BUT-JR says mist forests and marine should be HIGH	Public Education campaigns (fire, invasive species), projects to protect ecosystems/ biodiversity, enforcement of policies/ laws need to be strengthened to ensure that development does not undermine ecosystems, improve research / devt. , build capacity of specialists	Regional exchange of info Capacity building of local Funding to keep current projects going *get ecosystem services & cc info from wills agricole
LAND USE	MED - HIGH	Lots of policies and depts. exist – need support to implement and enforce guidelines/laws for dev't in coastal zone, TCPA, rivers act, EPA, etc. Revise insurance schemes,i.e. farmers	
TOURISM	MED / HIGH		



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