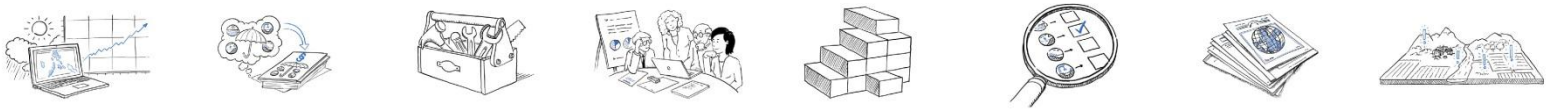
On behalf of

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany



Documentation

Final International Workshop of the IMACC-Project
Inventory of Methods for Adaptation to Climate Change

15-17 June 2013 in Bonn, Germany

On behalf of

of the Federal Republic of Germany

Published by

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Registered offices
Bonn and Eschborn, Germany
T +49 228 44 60-0 (Bonn)
T +49 61 96 79-0 (Eschborn)

Friedrich-Ebert-Allee 40
53113 Bonn, Germany
T +49 228 44 60-0
F +49 228 44 60-17 66

Dag-Hammarskjöld-Weg 1-5
65760 Eschborn, Germany
T +49 61 96 79-0
F +49 61 96 79-11 15

E info@giz.de
I www.giz.de

Environment & Climate Change Division
Competence Centre for Climate Change

Responsible
Michael Hoppe

Report prepared by
Timo Leiter, Nele Bünner, Ramon Cortes, Michael Hoppe (GIZ-IMACC-Team)
Dominik Reusser, Jürgen Kropp (PIK)
Sofia Muñoz Alarcón (GIZ Mexico)
With the support of Fabian Busch (denkmodell)

Photo credits

August, 2013

On behalf of
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Contents

1. Executive Summary

With a view to foster exchange and learning in the field of adaptation to climate change, some 50 international adaptation practitioners, i.e. government officials, scientists and representatives of development cooperation, met from **15 to 17 of June 2013 in Bonn, Germany**. Participants followed the invitation of the project **"Inventory of Methods for Adaptation to Climate Change" (IMACC)**, which is funded by the International Climate Initiative (ICI) of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and jointly implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Potsdam Institute for Climate Impact Research (PIK).

IMACC supports the advancement of tools and methods for climate change adaptation and documents application experience in its **seven partner countries: Grenada, India, Indonesia, Mexico, Philippines, South Africa, and Tunisia**. The project encourages peer-to-peer learning through knowledge sharing and exchange amongst institutions and individuals in its partner countries and beyond. As **IMACC is coming to an end in 2013** the workshop aimed at consolidating results and identifying future fields of action.

Further cooperation potential identified

Representatives of all seven countries presented the climate change adaptation context in their countries including key vulnerabilities, national policies and institutional arrangements, activities as well as barriers and opportunities for adaptation. This overview was received by participants as very valuable and instrumental in identifying individuals and institutions for further exchange.

Discussion also took place in four working groups. **The working group on climate information and services** came up with checklist questions to support preparing climate information for adaptation action at local levels. Ways to certify information services as well as how to build trustful user-provider-relationships are core issues for further discussion. **The group on mainstreaming adaptation** prepared a recommendations paper that stems from several years of experience in integrating adaptation into institutions, plans and projects, which can serve as guidance to other adaptation practitioners. Participants in **the group on monitoring and evaluation of adaptation** had an intensive discussion about the different approaches for national level M&E systems and generated some new ideas. The results will be reflected in a working paper on lessons and recommendations. Finally, **the group on transition pathways and the climate risk index** developed by PIK used the opportunity to clarify the scientific concepts behind the two approaches and suggested several next steps, including the application of the index at national level.

Retaining the spirit of knowledge sharing and learning

At the end of the workshop, which saw a great deal of lively discussion, participants agreed that the **exchange across partner countries initiated by the IMACC project needs to be continued** in the future. It became clear that the topic of monitoring and evaluation of adaptation was of great interest to all countries represented in Bonn. Concrete activities for further knowledge sharing and learning with the support of – but also beyond – the IMACC project were agreed upon. The IMACC platform AdaptationCommunity.net will continue to provide a hub for exchange, documentation of adaptation experiences and webinars.

2. Agenda

Saturday, 15 June 2013: Setting the Scene	
14:00	**Welcome and opening** ▪ Michael Hoppe, Team Leader of GIZ IMACC Project ▪ Prof. Dr. Jürgen Kropp, Head of the Research Area: Climate Change and Development at (PIK)
14:20	**Strengthening the adaptation process: how to move forward**, panel discussion with: ▪ Prof. Dr. Jürgen Kropp, Potsdam Institute for Climate Impact Research, Germany ▪ Dr. S. Satapathy, Ministry of Environment and Forests, India ▪ Vera Scholz, Head of GIZ Competence Centre for Climate Change, Germany ▪ Tilman Hertz, Programme Office of the International Climate Initiative of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Germany ▪ Andrew Rhodes, National Commission for Protected Areas, Mexico
16.00	Coffee break
16.30	**Overview of the Inventory of Methods for Adaptation to Climate Change (IMACC)** ▪ Adaptation activities and results of the project in partner countries ▪ Highlights from the discussion series taking place on the virtual platform AdaptationCommunity.net
17.30	Meet and Greet at the workshop venue followed by joint dinner at “Gino”
Sunday, 16 June 2013: Advancing adaptation in practice	
09.40	**Adaptation market place Round I** Exploring adaptation activities in IMACC partnering countries
10.40	Coffee break
11:10	**Adaptation market place Round II**
12.30	Lunch break
14.00	**Introduction of working groups** Interviews with working group hosts on key questions of adaptation in 4 focus areas 1. Climate Information & Services (GIZ) 2. Mainstreaming Adaptation (GIZ) 3. Monitoring and Evaluation of Adaptation (GIZ) Transition Pathways / Climate Risk Index (PIK)
14:20	**Adaptation practices: Exchange about challenges and solutions in parallel working groups** (includes Coffee break)
17.30	**Summary of the day**
19.00	Joint dinner at restaurant “Hotel zur Post”

Monday, 17 June 2013: Fostering exchange via AdaptationCommunity.net	
09.00	**Welcome and overview of the day**
09.10	**Introduction to the online platform AdaptationCommunity.net**
09:30	**Presentation of results of the 4 working groups** (see Sunday) *(This session was broadcasted as a webinar on AdaptationCommunity.net with the possibility for community members back home to actively engage online)*
11.00	Coffee break
11.30	**Reflections on the way forward** ▪ Future activities in IMACC partnering countries and opportunities for further international exchange ▪ Considerations on the role of AdaptationCommunity.net
12.30	**Wrap-up and closing remarks**
13.00	**End of the workshop**
13.30	Lunch

3. Panel Discussion

Strengthening the adaptation process: how to move forward

From left to right: Fabian Busch (Facilitator), Dr. S. Satapathy (India), Andrew Rhodes (Mexico), Vera Scholz (GIZ), Prof. Dr. Jürgen Kropp (PIK), Dr. Tilman Hertz (Programme Office of ICI)

Dr. S. Satapathy, Director, Climate Change Division of the Ministry of Environment and Forests (MoEF) of India explained that the Indian National Action Plan on Climate Change consists of eight national missions, four of which focus on adaptation. He named **financing and technology as well as coordination** among states as important issues for the international level to strengthen national adaptation processes. Dr. Satapathy also highlighted the **need for climate information**, particularly in regard to **regional information on the impacts of climate change**. He also said his Ministry is aiming for **co-benefits between mitigation and adaptation**.

Dr. Tilman Hertz, Advisor at the Programme Office of the International Climate Initiative (ICI) of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) said that since its establishment in 2008 **ICI has allocated over 860 million Euro for some 300 projects** in three clusters: Mitigation, Adaptation, Forests and REDD+. Dr. Hertz stated that National Adaptation Plans (NAPs) will become an important tool to strengthen adaptation, especially since they are country driven processes and approaches.

Andrew Rhodes, Director of Climate Change Strategies, National Commission of Natural Protected Areas (CONANP) of Mexico stated that his government has just launched the second national climate change strategy and last year adopted a national climate change law. A key barrier to adaptation was identified as very little coordination happening among sector departments. Therefore, the new climate change strategy focuses on **territorial needs rather than sectorial needs**. Another barrier are conflicting developments, e.g. building a dam where it increases vulnerability. To counter this, Mr Rhodes pointed to the importance of local participatory forums to promote local learning. He also stressed the **need for adapting institutions**, instruments and programs to ensure coherent investments that really reduce vulnerability.

Prof. Dr. Jürgen Kropp, Head of the Research Area: Climate Change and Development at the Potsdam Institute for Climate Impact Research (PIK) pointed to the needs of developing and OECD countries to generate ideas on **how a transition to a sustainable and low carbon economy could look like** for the respective country. He also addressed the issue that vulnerability assessments are usually not comparable and announced that PIK performed a large **climate change impact inter-comparison project**. **Vera Scholz**, Head of the Competence Centre for Climate Change of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ): Ms Scholz said development cooperation should invest in climate information and its interpretation and help making it understandable to policy-makers and practitioners. It should also invest in supporting the establishment of advisory services, e.g. for farmers. Ms Scholz highlighted the need for further action on mainstreaming and upscaling adaptation. In this regard she explained that GIZ and its sister organization KfW have introduced a **mandatory Environmental and Climate Assessment** which, for every project, look at the risks of climate change and whether the project has benefits for mitigation and/or adaptation.[1]

Referring back to the **animated movie "We know enough about climate change – now let's adapt"**[2], a joint project by IMACC and PIK, the moderator Fabian Busch asked panellists whether they agree with its title. Dr. S. Satapathy said he agrees that **low regret options are possible**. He added that for adaptation to happen, knowledge needs to be supplemented with the capability to act. Andrew Rhodes stated that current institutions are often not prepared to adapt and highlighted the **need for institutional change**. Vera Scholz pointed to the role of **indigenous knowledge** for observing and understanding local changes. Prof. Jürgen Kropp said whilst there was a sufficient level of understanding of climate change at global level, **information on regional impacts is still limited**. Nevertheless a lot of initiatives try to broaden the basis of our understanding in this field. Lokendra Thakker from the Government of Madhya Pradesh referred to this perspective as the "Earthworm view" compared to the global bird's-eye view, expressing that information on impacts and **practical knowledge on adaptation at sub-national level** still presents a bottleneck. Prof. Jürgen Kropp pointed to the newly released Report "*Turn Down the Heat - Climate Extremes, Regional Impacts, and the Case for Resilience*"[3]. Prof. Kropp stressed that atmospheric carbon dioxide concentration has passed the 400ppm level, the highest level since the Pliocene (3 million years BP) when it was much warmer and sea level more than 9m higher. When these are the things to come any mitigation and adaptation effort could be outpaced by the reality. This makes clear the absolute urgency to act now.

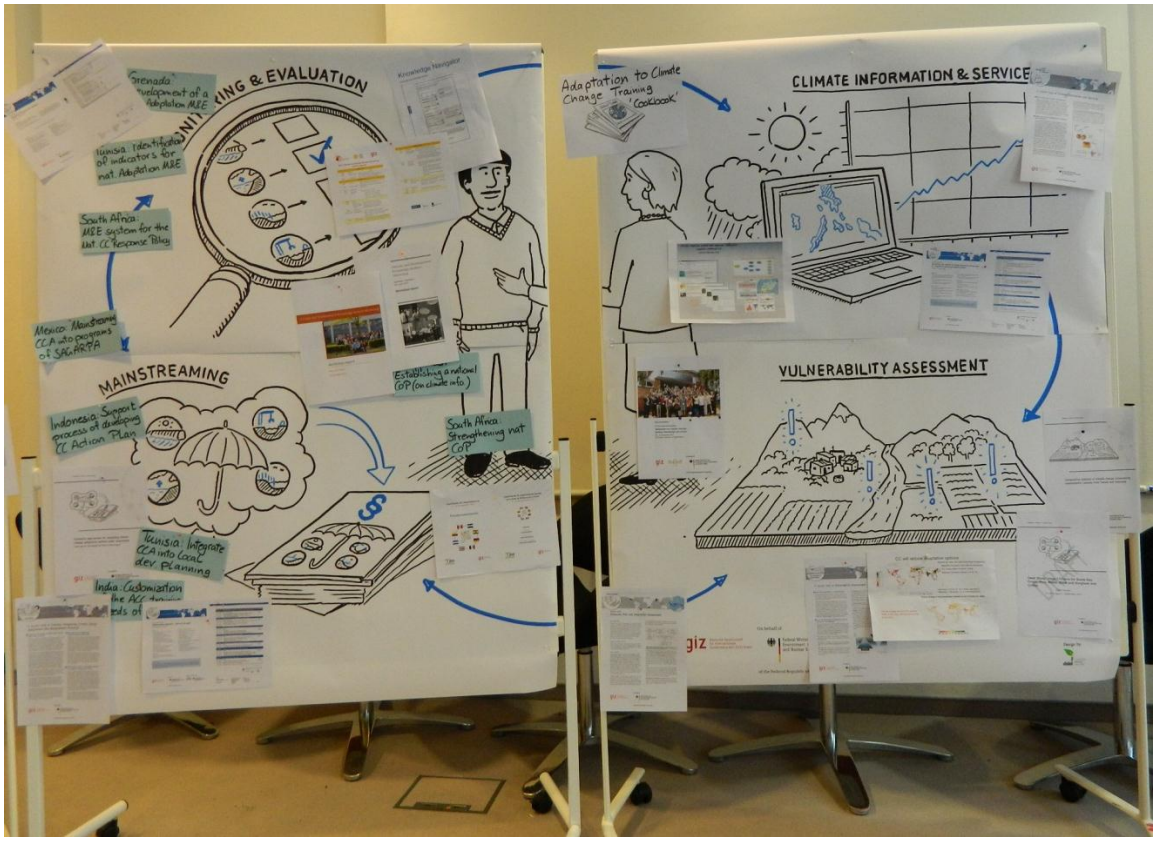
[1] Further details are described in the factsheet: http://star-www.giz.de/fetch/4Q0ox4X0001G0gE9d1/giz2013-0546en-environmental-climate-assessment.pdf

[2] Available in seven languages at the GIZ You Tube channel – climate change stream: http://www.youtube.com/watch?v=FO46sPwm4xk&list=PLcjTOiq3BComgKmYvWsflogrH1VxxEn7o

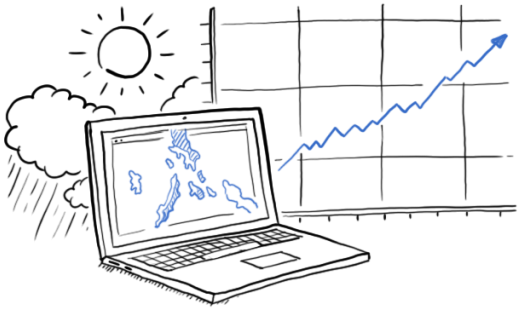
[3] Available at: http://documents.worldbank.org/curated/en/2013/06/17862361/turn-down-heat-climate-extremes-regional-impacts-case-resilience-full-report

4. Overview IMACC Activities and Results

Results and products of the Inventory of Methods for Adaptation to Climate Change (IMACC) project were presented. They can be accessed by visiting AdaptationCommunity.net or by following the denoted links below.



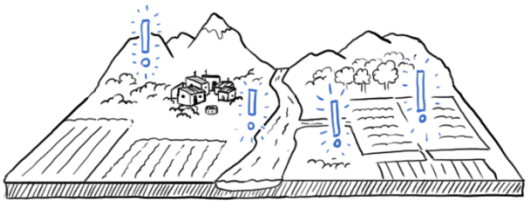
4.1 Climate Information & Services



Introduction to the topic: A closer look at Climate Information & Services

- **Short introduction to the topic**: Climate Information & Services at a glance
- **Study on climate data management and organization**: Metadata Standards, Data Catalogues and Data Requirements for the Identification of Climate Impacts, M. Dresen, Eschborn, Germany. GIZ (2011)
- **Discussion Series on Climate Information & Services:** a series of webinars presenting many application examples from different countries and institutions looking at the topic from different perspectives, e.g. from an international, national and local, or from planers, policy makers and stakeholders perspective.
- **Summary of the Discussion Series** on Climate Information & Services
- **Training modules** on Climate information and dealing with uncertainty, Module 2 of the training "Integrating Climate Change Adaptation into Development Co-operation"
- Draft checklist for provision of Climate Information & Services (see Annex 1)
- New **climate impact index** connecting climate impacts to livelihood conditions (see Annex 4)
- Subnational assessment of the effect of water-stress for livelihood conditions in Indonesia and South-Africa (see Annex 4)
- "**A Human Development Framework for CO2 Reductions**" (see Annex 4): an allocation framework for the remaining carbon budget limiting global warming to 2°C.
- **ci:grasp 2.0** – Climate Information: Global and Regional Adaptation Support Platform http://www.pik-potsdam.de/cigrasp-2/
- **Method Briefs** on Climate Information & Services (more available soon):
  - South Africa: The Climate Information Portal – providing climate information to users
  - Tunisia: Metadata Cataloguing on Climate Change
  - South Africa: Risk and Vulnerability Atlas

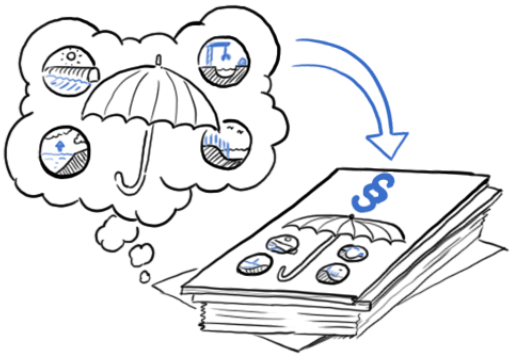
4.2 Vulnerability Assessment



- **Introduction to the topic**: A closer look at Vulnerability Assessments
- **Short introduction to the topic**: Vulnerability Assessments at a glance
- **Study comparing different Vulnerability Assessments**: Comparative analysis of climate change vulnerability assessments: Lessons from Tunisia and Indonesia, A. Hammil, L. Bizikova, J. Karami and M. McCandless, Eschborn, Germany. GIZ (2013)[4]
- **Study on climate change impacts on important cash crops**: Impact Chains for Some Key Crops: Rice, Maize, Millet and Sorghum and Coffee, B. Eggen and L. Waldmüller, Eschborn, Germany. GIZ (2013)
- Study on Climate **Change Impact Chains in Coastal Areas** (see 5.8 for details)
- Study on past and future food consumption patterns and related emissions: **Embodied Greenhouse Gas Emissions in Diets** (see Annex 4 for details)
- Study on the **potential for local food production** through peri-urban agriculture under climate change (see Annex 4 for details)
- **Method Briefs** on Vulnerability Assessments (more available soon):
  - Indonesia: Vulnerabilities of ecosystem-dependent communities
  - India: Bottom-up vulnerability assessment
  - Tunisia: Vulnerability assessment of an olive plantation ecosystem

[4] Please see also: Costa L, Kropp JP (2013): Linking components of vulnerability in theoretic frameworks and case studies. *Sustainability Science* 8(1): 1-9 and Climate Vulnerability Monitor (2013), 2nd edition: http://daraint.org/climate-vulnerability-monitor/climate-vulnerability-monitor-2012/report/

4.3 Mainstreaming Adaptation



- **Introduction to the topic**: A closer look at Mainstreaming Adaptation
- **Short introduction to the topic**: Mainstreaming Adaptation at a glance
- **Study on approaches for assessing climate change adaptation options**: Economic approaches for assessing climate change adaptation options under uncertainty, S. Noleppa, Eschborn, Germany. GIZ (2013) (available online soon)
- **Excel tools** for Cost-Benefit-Analysis and Multi-Criteria-Analysis, S. Noleppa, Eschborn, Germany. GIZ (2013)
- **Discussion Series on Mainstreaming Adaptation and Trainings:** a series of webinars presenting many application examples from different countries as well as national and international institutions looking at the topic from different perspectives, e.g. from an international, national and local, or from planers, policy makers and stakeholders perspective
- **Summary of the Discussion Series** on Mainstreaming Adaptation
- **Discussion Series on Cost-Benefit-Analysis in Adaptation:** a series of webinars presenting many application examples from different countries looking at CBA conducted at different levels – project to national level
- **Method Briefs** on Mainstreaming
  - Indonesia: Risk & Adaptation Assessment
  - Indonesia: Climate resilience strategies for cities
  - Indonesia: Integrated Climate Action in Cities
  - Indonesia: CC Mainstreaming in watersheds
  - Mexico: Multi-Criteria-Analysis
  - Germany: Mainstreaming adaptation into coastal protection
  - EU: Mainstreaming through a new adaptation strategy

4.4 Adaptation Monitoring & Evaluation (M&E)

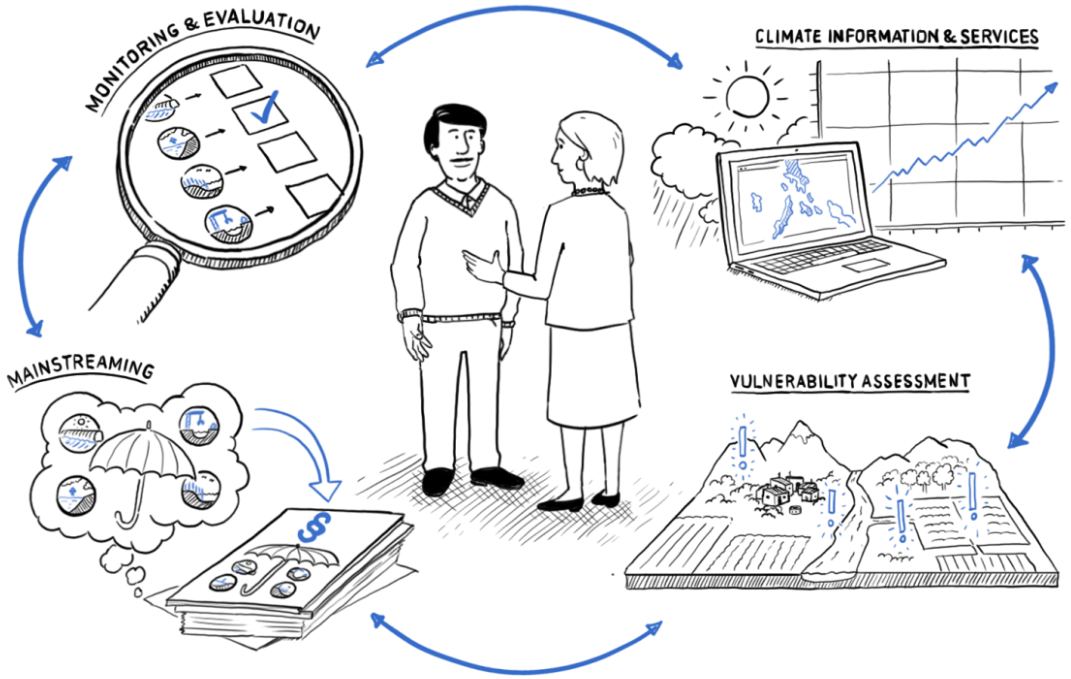
- **Introduction to the topic**: A closer look at Adaptation M&E
- **Short introduction to the topic**: Adaptation M&E at a glance
- **Discussion Series on Adaptation M&E:** a series of webinars presenting application examples from pioneering countries at national and local level and discussing challenges and approaches of monitoring adaptation
- **Summary of the Discussion Series** on Adaptation M&E
- **Recommendation paper** on Adaptation M&E at national level
- **Training modules** on Adaptation M&E as part of the GIZ-OECD Adaptation Training
- Documentation of the International Workshop and Training on Adaptation Monitoring and Evaluation in Mexico in April 2013
- **Method Briefs** on Adaptation M&E (more available soon):
  - Philippines: Developing an M&E System for the National Climate Change Action Plan
  - Germany: M&E of the German Adaptation Strategy
  - India: Learning from project experiences

4.5 Training

- **Introduction to the topic**: A closer look at Training
- **Short introduction to the topic**: Training 'Integrating Climate Change Adaptation into Development Planning' at a glance

- **Discussion Series on Mainstreaming Adaptation and Trainings:** a series of webinars presenting many application examples from different countries and institutions looking at the topic from different perspectives, e.g. from an international, national and local, or from planers, policy makers and stakeholders perspective
- **Training modules** on climate information (jointly developed between GIZ and PIK) and dealing with uncertainty, Module 2 of the training "Integrating Climate Change Adaptation into Development Co-operation" have been developed, a test-training took place in Berlin in March 2012 and an echo-training was conducted in June 2012 in Pasig City, Philippines
- Several trainings have been conducted which were supported by IMACC, for instance **Training of Trainers** (ToT) in **Morocco** and **Costa Rica**, a **Training of Multipliers** (ToM) in **Bogor** as well as several national training activities.
- **Training modules** on Adaptation M&E of the training "Integrating Climate Change Adaptation into Development Co-operation" have been developed, a test-training took place in Mexico in April 2013 (report and trainings material available online soon)

4.6 Exchange on Adaptation to Climate Change and beyond



- **AdaptationCommunity.net** – a platform for exchange on adaptation to climate change
- **Discussion Series** on each of the four topics (see above)
- **IMACC Kick-off workshop** in Durban (workshop report)
- **International workshop and training on Adaptation M&E** in Mexico (see above)
- **Final project workshop** Bonn (this is its report)
- Many workshops in the partner countries

- Exchange with other Climate Platforms through the **Climate Knowledge Brokers (CKB) Group**. CKB aims at helping users navigate more quickly and easily to the information they need by creating greater coherence and inter-linkages between climate information providers. The CKB Group is also developing common tools such as the Knowledge Navigator, a 'portal-of-portals' that directs the user to the most relevant climate information platform. Three workshops have been hosted by GIZ/IMACC. The workshop reports can be found on the CKB homepage.

4.7 Country activities

Together with partners in the respective countries, IMACC has implemented many activities in the field of adaptation to climate change. Among the many activities are:

- Tunisia: Integrating Climate Change Adaptation into Local Development Planning
- South Africa: Consultation on the process of developing a National Climate Change Adaptation Response M&E System
- Philippines: Integrating Climate Change Adaptation into Land Use Planning
- Mexico: supporting the process of mainstreaming Adaptation to Climate Change into national programmes of the Ministry of Agriculture
- Indonesia: Support to the development of the National Action Plan for Climate Change Adaptation
- India: Training customization in Madhya Pradesh with focus on health, water agriculture and forests sectors
- Grenada: Support for the development of a National M&E System

For more activities on adaptation to climate change and the support IMACC has provided within the past two years, please refer to the country presentations form the market place.

5. Market Place of Adaptation Activities in IMACC Partner Countries

The morning session of the second workshop day provided the space for representatives of all seven IMACC partner countries to present the climate change adaptation context in their countries during a market place.

Based on a template, country delegations prepared pin boards outlining **key vulnerabilities, national policies and institutional arrangements, activities as well as barriers and opportunities for adaptation**. This overview was perceived by participants as very **valuable in identifying individuals and institutions for further discussion**. Below you find a photo and reproduction of each country's pin board.

In addition, results of the study **"Climate Change Impact Chains in Coastal Areas (ICCA)"** as well as the GIZ-OECD adaptation **training "*Integrating Climate Change Adaptation into Development Co-operation*"** were presented.

5.1 Grenada

GRENADA							
I National Context	**II Vulnerability**	**III Sectors**	**IV Policy Context**	**V Coordination**	**VI Activities**	**VII Adaptation…**	**VIII IMACC**
						…barriers / **…opportunities**	
Small island Direct interaction [between local and national] Feedback & Complexity	▪ Droughts ▪ Intense hurricanes ▪ Flooding ▪ Rising sea levels	**Tourism**: ▪ Coastal degradation ▪ Rainfall pattern (cruise ships tours) **Health**: ▪ New + (Re-) emerging diseases ▪ Water quality **Agriculture**: ▪ Land degradation ▪ Irrigation needs ▪ Pest + diseases **Water resources**: ▪ Water quantity ▪ Water quality ▪ Critical infrastructure ▪ Beach erosion ▪ Ports ▪ Airport ▪ Energy ▪ Roads **Coastal zones**: ▪ Settlement Development ▪ Salt water intrusion ▪ Sand mining ▪ Mangroves renewal	No national adaptation policy / plan (Outdated) Very visible internationally but implementation weak Sector plans/ policies ▪ CC policies + action plan ▪ Agriculture ▪ Water ▪ tourism	▪ National CC Committee ▪ Sustainable Dev. Council Problems: ▪ Technical capacities gap ▪ Weak implementation	Piecemeal Approach ▪ Disaster/climate proofing ▪ Vulnerability mapping ▪ Hazard mapping ▪ Water policy + legislative framework ▪ Discussion “risk insurance” ▪ Mapping “non-economic” water resources	▪ Small size ▪ Topography ▪ Land tenure/use ▪ Human Capacity Base ▪ Lack of interaction ▪ Financing ▪ Lack of private sector investment	▪ Social capital ▪ Low investment needed for high impact ▪ Academia research ▪ Great base for pilot projects New GIZ Project: **Integrated CC Adaptation Strategies (ICCAS)**	▪ Mexico WS ▪ M&E System ▪ Impact chains


GRENADA
National Context
Vulnerability
I
Small Island
Direct Interaction
Feedback + Complexity
III
Sectors
Coral Degradation
Rainfall patterns/ Cyclone Tracks
New(re) Emerging Diseases
Water Quality
TOURISM
HEALTH
Land Degradation
Irrigation Needs
Pest + Disease
AGRICULTURE
Droughts
Intense Hurricanes
II
Events
Flooding
Storage Sea levels
Coastal Zones
Settlement Development
Sand Mining
Mangroves Removal
WATER RESOURCES
Critical Infrastructure
Beach Erosion
Ports
Water Quality
Water Quality
Energy
Airport
Roads, public facilities

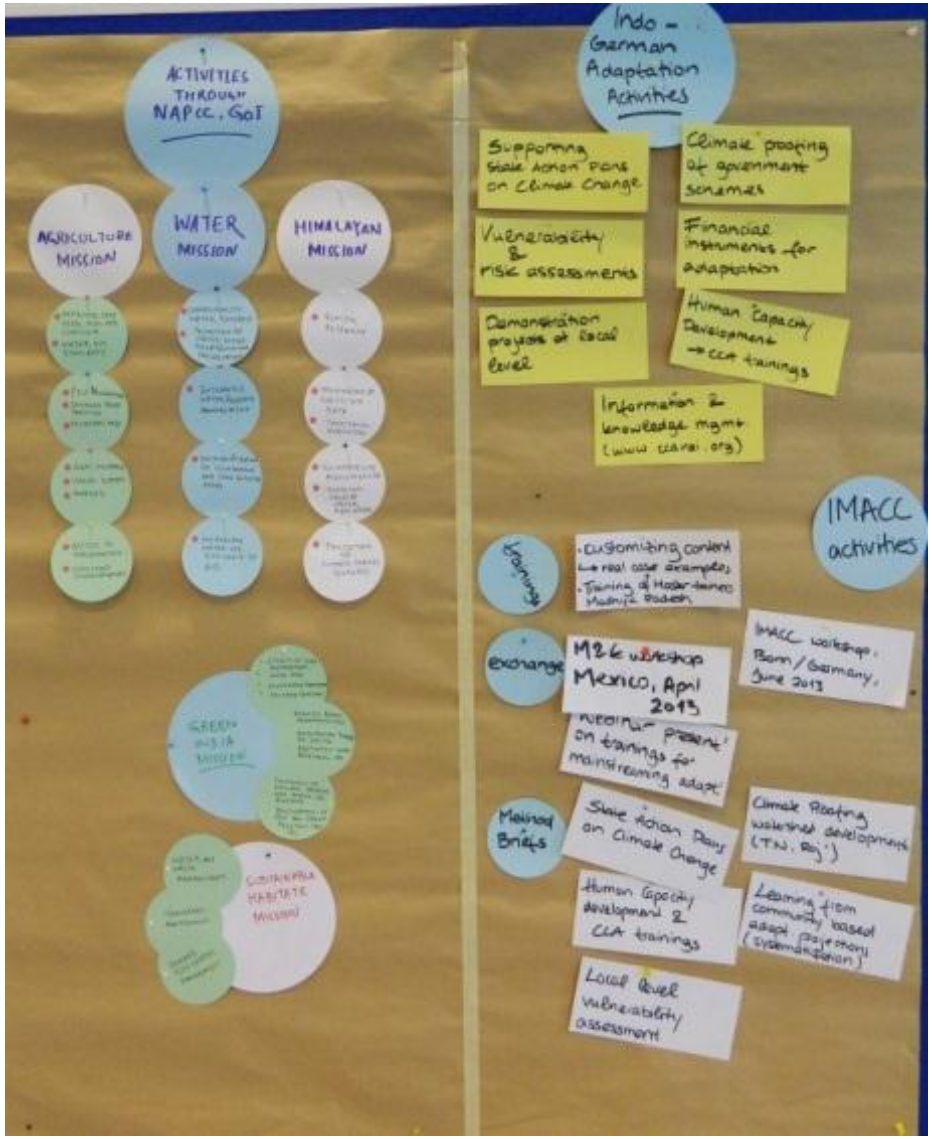

Policy Context
IV
No National Plan Adaptation Policy
CC policies + action plan
Outdated
Coordination
V
National CC Committee
Sustainable Dev. Council
Technical capacities Gap
ICCAS
Agriculture
Sectoral Plans/Policies
Water
Tourism
Barriers to Adaptation
VII
opportunities for adaptation
VI
Activities
Disaster, Climate Profiles
Vulnerability Mapping
Hazard mapping
Mapping 'Non-Erosion Wide Beaches'
Piece meal Approach
Discussion
Risk Insurance
Water Policy + Legislative Framework
Small size
Topography
Land tenure/ use
Human Capacity Base
Lack of Integration
Financing
Lack of Private Sector Involvement
SOCIAL CAPITAL
LOW INVESTMENT
HIGH IMPACT
ACADEMIA RESEARCH
GREAT BASE FOR PILOT PROJECTS SIDS
IMACC
Mexico-WS
VIII
Impact Chains M+E-System
to come

5.2 India

<table>
<tr><th colspan="8">INDIA</th></tr>
<tr><th colspan="2">Core documents and bodies</th><th colspan="2">National missions on CC</th><th colspan="2">Sub national level</th><th>Sectors</th><th>Regions</th></tr>
<tr><td colspan="2">▪ National action plan on climate change
▪ Prime Ministers council on climate change
▪ Executive committee on climate change
▪ Ministry of Environment and Forests (MOEF) National steering committee CC division
▪ Climate change impact assessment in India</td><td colspan="2">▪ Agriculture mission
▪ Himalaya mission
▪ National solar mission
▪ Sustainability habitat mission
▪ Energy efficiency mission
▪ Green India mission
▪ Water mission
▪ Strategic knowledge mission</td><td colspan="2">▪ State steering committee
▪ Department of Environment
▪ State action plans on climate change
▪ 22 State Action Plans on Climate Change (SAPCC) submitted, 9 approved
▪ Approach for adaptation-mitigation co-benefits
▪ Regions covered: western, central</td><td>▪ Ecosystems
▪ Human health
▪ Agriculture
▪ Water</td><td>▪ Himalayan region
▪ Northeast India
▪ Coastal region
▪ Western ghats</td></tr>
<tr><th colspan="5">Activities through National Action Plan on CC, Gov. of India</th><th>Indo-German Act.</th><th colspan="2">IMACC Activities</th></tr>
<tr><th>Agriculture mission</th><th>Water mission</th><th>Himalayan mission</th><th>Green India mission</th><th>Sustainable habitat mission</th><th rowspan="2">Supporting state action plans on climate change:
▪ Vulnerability & risk assessment
▪ Demonstration projects at local level
▪ Climate proofing of government schemes
▪ Financial instruments for adaptation
▪ Human capacity development → CCA trainings
▪ Information & knowledge (www.ccarai.org)</th><th>Training</th><th>Exchange</th><th>Method briefs</th></tr>
<tr><td>▪ Improved crop seeds, fish and livestock
▪ Water use efficiency
▪ Pest mgt.
▪ Improved farm practices
▪ Nutrient mgt.
▪ Agri. insurance
▪ Credit support
▪ Markets
▪ Access to information
▪ Livelihood diversification</td><td>▪ Comprehensive water database
▪ Promotion of water conservation augmentation preservation
▪ Integrated water resource management
▪ Focussed attention on vulnerable and over exploited areas
▪ Increasing water use efficiency by 20%</td><td>▪ Glacier research
▪ Monitoring of ecosystem data
▪ Traditional knowledge
▪ Vulnerability assessment of ecosystems, tourism, water and agriculture
▪ Projection of climate change scenario</td><td>▪ Effective fire mgt.
▪ Weed mgt.
▪ Sustainable harvesting
▪ Securing corridors
▪ Reduced forest fragmentation
▪ Anticipatory plan of species
▪ Adoption of short rotational species
▪ Promotion of natural regenerating and mixed species
▪ Development of pest and drought resistant tree species</td><td>▪ Water and waste mgt.
▪ Transport mgt.
▪ Demand side energy mgt.</td><td>Customizing content→real case examples

Training of Master trainers Madhya Pradesh</td><td>▪ M&E Workshop Mexico, March 2013
▪ Webinar presentation on training and mainstreaming for adaptation
▪ IMACC workshop, Bonn/Germany June 2013</td><td>▪ State action plans on CC
▪ Human capacity development & CCA trainings
▪ Local level vulnerability assessment
▪ Climate proofing watershed development (Tamil Nadu, Rajasthan)
▪ Learning from community based adaptation projections (systematization)</td></tr>
</table>

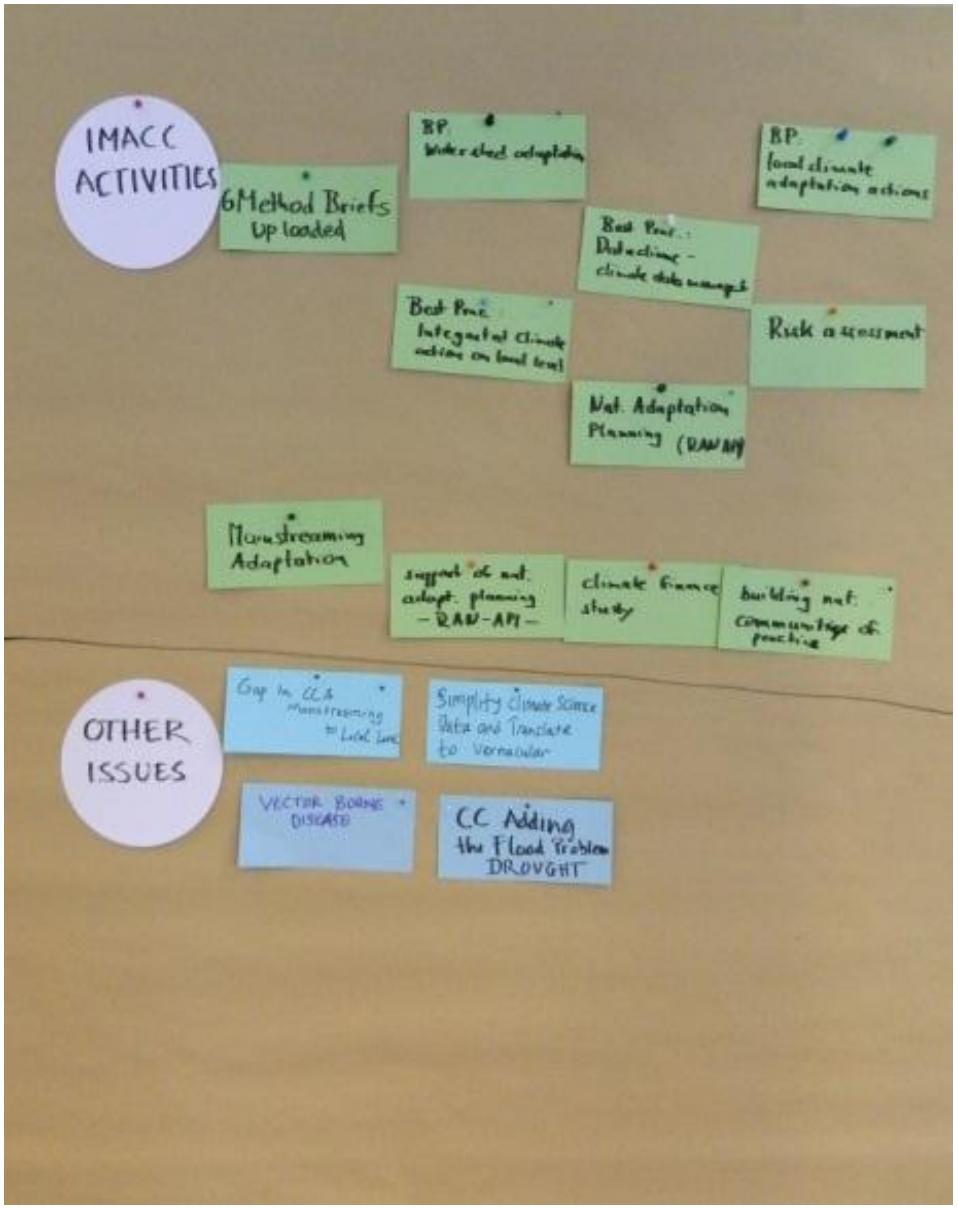

india
PRIME MINISTER'S COUNCIL ON CLIMATE CHANGE
EXECUTIVE COMMITTEE ON CLIMATE CHANGE
MOEF NATIONAL STEERING COMMITTEE
NATIONAL ACTION PLAN ON CLIMATE CHANGE
SUB NATIONAL LEVEL
STATE STEERING COMMITTEE
DEPARTMENT OF ENVIRONMENT
STATE ACTION PLANS ON CLIMATE CHANGE
CLIMATE CHANGE IMPACT ASSESSMENT IN INDIA
SECTORS
REGIONS
WATER MISSION
HIMALAYAN MISSION
NATIONAL SOLAR MISSION
BROAD CONTOURS OF CLIMATE CHANGE VULNERABILITY


Indo - German Adaptation Activities
ACTIVITIES THROUGH NAPCC, GoI
AGRICULTURE MISSION
WATER MISSION
HIMALAYAN MISSION
Supporting State Action Plans on Climate Change
Climate proofing of government schemes
Vulnerability & risk assessments
Financial instruments for adaptation
Demonstration projects at local level
Human Capacity Development - CCA trainings
Information & knowledge mgmt (www.ccaiia.org)
IMACC activities
Trainings
Customizing content w real case examples
Training of Master-trainers Module finalised
Exchange
M&E workshop Mexico, April 2013
IMACC workshop Bern/Germany, June 2013
Planning for present on trainings for mainstreaming adapt
Mailed Briefs
State Action Plans on Climate Change
Climate Proofing watershed development (TN, Raj)
Human Capacity development & CCA trainings
Learning from community based adapt projects (implementation)
Local level vulnerability assessment

5.3 Indonesia

INDONESIA			
National adaptation policy	▪ National action plan on climate change (RAN PI) – 2007 ▪ Law 32 Environmental protection & Management – 2009 ▪ Indonesian climate change sectoral road mad (ICCSR) – 2010		
Main actors and policy documents	Coordination body	▪ Under development ▪ To be placed in national planning agency (BAPPENAS)	
	Ministry of the Environment	▪ Ran Pi ▪ SIDIK (Data index and information system on CC Vulnerability) ▪ KRAPI (Climate Risk and Adaptation Assessment)	
	National plan (National planning authority: Bappenas)	▪ ICCSR ▪ RAN API (National Action Plan on Climate Change Adaptation) ▪ POKJA CC (Climate Change Working Group) ▪ Yellow Book	
	Ministry of Public works	▪ RAN MAPI (National Action Plan on Mitigation of and Adaptation to Climate Change) ▪ Ministerial Decree and vulnerability assessment (spatial planning) ▪ Coordinating Working Group	
	National council for climate change	International negotiations, national reporting, research and public awareness	
	Ministries	▪ Health ▪ Agriculture ▪ Transportation	▪ Tourism ▪ Forestry ▪ Marine + Fishery
Scientific actors	▪ BMKG (National Met agency) ▪ University ▪ Research institute	▪ Observation ▪ Data collection ▪ Data analysis ▪ Climate modelling	▪ Climate field school ▪ CCIS ▪ Vulnerability Assessments ▪ Public awareness
Barriers (& Opportunities)	▪ Climate Change adaptation is still a new field, so coordination mechanisms have not been set up ▪ Awareness is still developing ▪ Methodology & information demand not systematically assessed/known		
IMACC Activities	▪ 5 method briefs uploaded on AdaptationCommunity	Climate Resilience Strategies for Cities; Integrated Climate Action in Cities; Mainstreaming Climate in Watersheds; Risk and Adaptation Assessment; Vulnerabilities of Ecosystem-dependent Communities	
	▪ Mainstreaming adaptation	▪ Support of national adaption planning for RAN API ▪ Climate finance study ▪ Building a national community of practice ▪ Exchange with other countries in workshops (M&E) and webinars	
Other Issues	▪ Gap in CC mainstreaming to local level ▪ Simplify and translate climate science data	▪ CC adding to the flood problem and to drought ▪ Vector Borne Diseases	

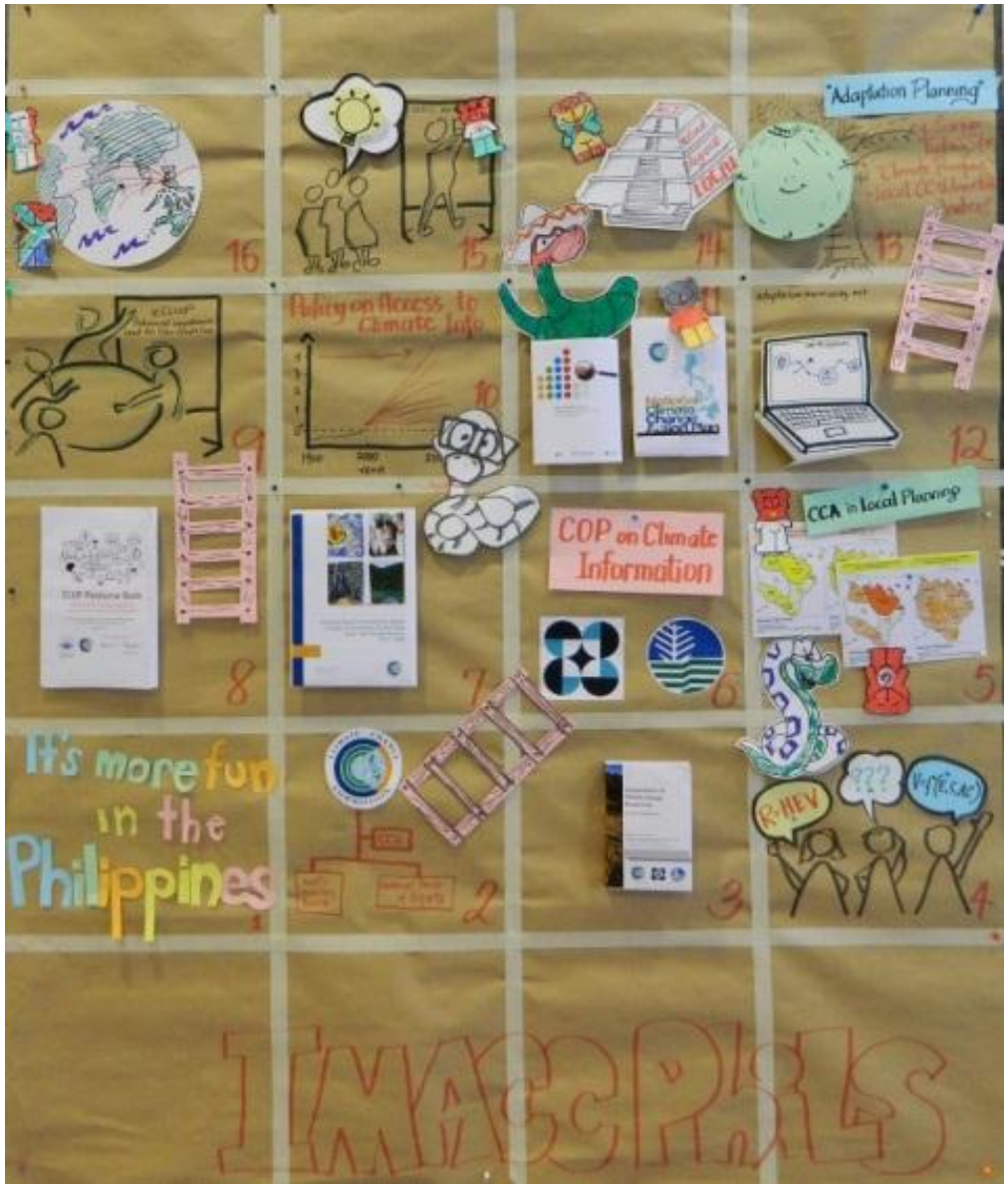

Indonesia
NATIONAL ADAPTATION POLICY
2007
2009
2010
MAIN ACTORS
Bappenas
M.E.
Ministry of Public Work
NATIONAL COUNCIL FOR CLIMATE CHANGE
COORDINATION BODY
UNDER DEVELOPMENT
TOBE IN NAT. PLANNING AGENCY
SCIENTIFIC ACTORS
DATA ANALYSIS
CLIMATE MODELLING
OBSERVATION
DATA COLLECTION
MET AGENCY (BMKG)
UNIVERSITY
RESEARCH INSTITUTE (LIPI)
OTHER ACTORS
Health
M. Agriculture
M. Transportation
M. Forestry
M. Tourism
BARRIERS & OPORTUNITY
METHODOLOGY
AWARENESS IN DEVELOPMENT


IMACC ACTIVITIES
6 Method Briefs Up loaded
Mainstreaming Adaptation
Risk assessment
Nat. Adaptation Planning
climate finance study
OTHER ISSUES
Simplify climate Science Data and Translate to Vernacular
VECTOR BORNE DISEASE
CC Adding the Flood Problem
DROUGHT

5.4 Mexico

<table>
<tr><th colspan="8">MEXICO</th></tr>
<tr><td colspan="3">Mainstreaming CCA</td><td colspan="5">Barriers</td></tr>
<tr><td>Agriculture</td><td colspan="2">Protected areas (PA) system</td><td>I</td><td>II</td><td>III</td><td>IV</td><td>V</td></tr>
<tr><td>Rainfall agriculture
▪ Conservation agriculture
▪ Productive reconversion</td><td colspan="2">▪ Climate information platform
▪ CC M&E
▪ PA Climate Change Strategy
▪ Resilient Mexico Alliance
▪ Adaptation Tool Kit (Adaptation guide, local vulnerability analysis, prioritization tool)
▪ Adaptation programmes</td><td>High climate variability</td><td rowspan="2">Lack of information and knowledge</td><td rowspan="2">Political pressure for short term results</td><td>Limited coordination</td><td>Need for mainstreaming CCA</td></tr>
<tr><td>Risk Management
▪ Index insurance
▪ Seasonal forecasting
▪ Commerce insurance</td><td colspan="2">Projects implementing</td><td>Differentiated risk (population, resources, geographic)</td><td>Limited additional funding</td><td>Cross-Cutting M&E</td></tr>
<tr><td>Irrigation techniques
▪ Farms
▪ Supply
▪ Distribution</td><td>Coastal watershed mgt. projects
▪ Connectivity between PA
▪ Payment for Environ. Services</td><td>▪ Restoration activities
▪ Invasive species control
▪ Environmental Education
▪ Rural community VA</td><td>Low education level in rural areas</td><td></td><td></td><td>Lack of institutional strengthening</td><td>Effective policy down-scaling</td></tr>
<tr><td>I</td><td colspan="2">III</td><td colspan="5">IV</td></tr>
<tr><td>Vulnerability</td><td colspan="2">National policy context</td><td colspan="5">National system on CC</td></tr>
<tr><td>Diverse conditions: from drought to flooding</td><td colspan="2" rowspan="4">▪ 2005: Inter-ministerial Commission on Climate Change
▪ 2007: National Strategy CC
▪ 2009: CC Special Programme
▪ 2012: Low Emissions, Adaptation Document
▪ Oct. 2012: CC Law
▪ Feb 2013: CiCC II
▪ June 2013: National Strategy CC
➔ CC Adaptation requires a constant learning process</td><td colspan="5" rowspan="4">▪ Climate change council
▪ National institute on ecology & Climate changes (INECC)
▪ Inter-ministerial commission on climate change CICC
Mitigation & Adaptation working group
▪ National congress, states and municipalities</td></tr>
<tr><td>II</td></tr>
<tr><td>Mexico</td></tr>
<tr><td>Population density Mexico City: 5,920/km2</td></tr>
<tr><td colspan="3">Policy functions</td><td colspan="5"></td></tr>
<tr><td colspan="3">Planning</td><td>Financing</td><td colspan="2">Instruments</td><td>Evaluation</td><td>Suspension</td></tr>
<tr><td colspan="3">▪ National CC Strategy
▪ Special program on CC
▪ CC State programs
▪ Municipality CC Program</td><td>CC Fund</td><td colspan="2">▪ Emissions Inventory
▪ Risk Atlas
▪ Economic Instruments
▪ Info System
▪ Nat'l Emission Registry</td><td>Coordination for Evaluation</td><td>Sanctions</td></tr>
</table>

5.5 Philippines


Adaptation Planning
Policy on Access to Climate Info
COP on Climate Information
CCA in Local Planning
It's more fun in the Philippines
IMACCPHILS


Adaptation Marketplace
in the Philippines
NETWORKING BOX
Feedback
Suggestions
Comments
ALAB NG PUSO

5.6 South Africa

<table>
<tr><th colspan="8">SOUTH AFRICA</th></tr>
<tr><th colspan="2">CC Vulnerabilities</th><th>National Policy Context</th><th>National Coordinating Bodies</th><th>In Country CC Adaptation Studies</th><th>Barriers to adaptation</th><th>South African Highlights</th><th>IMACC activities in South Africa</th></tr>
<tr>
<td colspan="2">▪ Extreme events impacting all sectors: storms, floods, droughts, extreme temperatures, disasters
▪ Rising temperatures (2 times global average)
▪ Changing rainfall patterns
▪ Sea-level rise</td>
<td rowspan="5">▪ National CC Response White Paper
▪ National Development Plan
▪ Provincial and municipal plans
▪ Sector specific CC plans: biodiversity, water, agriculture</td>
<td rowspan="5">▪ Department of Environmental Affairs
▪ Intergovernmental Committee on CC (IGCCC)
▪ Interministerial Committee on CC (IMCCC)
▪ National Committee on CC (NCCC)
▪ Sector departments' CC units
▪ Adaptation Network [non-government]</td>
<td rowspan="5">▪ Country study on CC (2003)
▪ Second National Communication (2011)
▪ South African Risk and Vulnerability Atlas (on going)
Long term adaptation scenarios (LTAS):
(1) Climate scenarios
(2) Sectoral impact assessments
(3) Adaptation responses and development scenarios
▪ Vulnerability and impact of CC on Tourism (2012)
▪ Strong research base (e.g. SA National Biodiversity Institute)</td>
<td rowspan="5">▪ Competing development priorities
▪ Funding
▪ Lack of capacity (development and implementation)</td>
<td rowspan="5">▪ Long term adaptation scenarios (LTAS)
▪ Let's respond tool kit [mainstreaming at local govt level]
▪ Development of M&E System
▪ "Working for" Flagship programmes [See National White Paper]
▪ National implementing entity to the Adaptation Fund
▪ Adaptation Network</td>
<td rowspan="5">▪ 7 Method briefs
▪ Sharing of knowledge at webinars
▪ National IMACC Workshop
▪ Support for Adaptation M&E development</td>
</tr>
<tr><td>Socio-economic</td><td>Natural resources</td></tr>
<tr><td>Poverty levels</td><td>Competition for water</td></tr>
<tr><td>Inequality</td><td>Environmental degradation</td></tr>
<tr><td>Human settlements vulnerable to climate extremes</td><td>Biodiversity and ecosystems</td></tr>
<tr><td>Health</td><td>Agriculture and fisheries</td></tr>
</table>


SOUTH AFRICA
Climate change Vulnerabilities
National Policy Context
Disasters
Socio-
economic
Natural Resources
Poverty levels
Competition for Water
Inequality
Environmental Degradation
Human Settlements
Biodiversity and Ecosystems
Health
Agriculture and Fisheries
National Climate Change Response White Paper
Provincial and Municipal plans
National Development Plan
Sector Specific Plans
National Coordinating bodies
DEPARTMENT OF ENVIRONMENTAL AFFAIRS


In-Country Climate Change Adaptation Studies
Barriers to Adaptation
Country Study on Climate change (2003)
South African Risk and Vulnerability Atlas (on going)
Second National Communication (2011)
Vulnerability and impact of climate change on Tourism (2012)
LONG TERM ADAPTATION SCENARIOS
Climate Scenarios
Understanding of Climate Change Issues
Funding
Lack of Capacity
Competing development priorities
South-African highlights
IMACC activities in South Africa
Let's Respond Toolkit
M+E System
Adaptation Network
Community and Ecosystem based adaptation
National IMACC Workshop
M+E Support

5.7 Tunisia

<table>
<tr><th colspan="8">TUNISIA</th></tr>
<tr><th colspan="3">CCA National Context</th><th colspan="5">CCA Initiatives</th></tr>
<tr><th colspan="2">Impacts</th><th>CCA Policy</th><th>Climate Proofing</th><th>Vulnerability Assessments</th><th>Constrains to adaptation</th><th colspan="2">IMACC Activities</th></tr>
<tr><td>Agriculture</td><td>2-3 years drought:
Loss of 50% of olive oil production</td><td rowspan="5">Sectoral Adaptation Strategies:
▪ Agriculture water resources and ecosystems
▪ Tourism
▪ Health Coastal areas

National CC Strategy

Coordinating adaptation at national level
▪ Env. Department (UNFCCC Focal Point)</td><td rowspan="5">• Management plan of “Saouaf” farm
• Natural Resources management project
• Project of depollution of lake “Bizerte”</td><td rowspan="5">▪ Olive tree production system
▪ Cork oak
▪ Alfa steppe
▪ Rangeland ecosystem

E.V.A Methodology adopted / to be used in regional project</td><td rowspan="5">▪ Lack of intersectoral coordination
▪ Lack of awareness of decision makers
▪ Weakness in the role of civil society
▪ Political transition</td><td>M&E CCA</td><td>▪ OTEDD-M&E CCA-Agriculture sector
▪ Participation in international WS in Mexico on M&E for CCA</td></tr>
<tr><td>Water Resources</td><td>30% decrease in water resources by 2030</td><td>Inventory of Methods</td><td>▪ Study: Traditional Know-How for CCA at local level
▪ 6 Method Briefs on AdaptationCommunity.net</td></tr>
<tr><td>Ecosystems</td><td>20% loss of Cork Oak forest by 2050</td><td>Climate Information & Services</td><td>▪ Training on metadata catalog (6 Institutions)
▪ Metadata catalog system on CC Tunisia
▪ Webinar in Climate Information Discussion Series</td></tr>
<tr><td>Health</td><td>Spread of Vector-borne and respiration diseases</td><td>Capacity Building</td><td>▪ Participation in training in Climate Modelling (at DWD, German met service)
▪ Training on Integrating CCA into Development (focus climate information): 5 Tunisian participants in Berlin
▪ Training of trainers on Integrating CCA into Development: Marrakech. 2012 – 2 Tunisian participants</td></tr>
<tr><td>Coasts</td><td>SLR: 18 cm (2050)</td><td></td><td></td></tr>
</table>


CCA National Context
TUNISIA
TRENDS
CCA POLICY
AGRICULTURE WATER RESOURCES AND ECOSYSTEMS
TOURISM
SECTORAL ADAPTATION STRATEGIES
HEALTH
COASTAL AREAS
IMPACTS
AGRICULTURE
2-3 years Drought
WATER R
~50% decrease in WR by 2030
ECOSYSTEMS
HEALTH
COASTS
SLR 18 Cm (2050)
COORDINATING ADAPTATION AT NATIONAL LEVEL
ENV DEPARTMENT (UNFCCC FP)
NATIONAL STRATEGY CC


CCA INITIATIVES
IMACC
MANAGEMENT PLAN OF "SAOUAF" FARM
NATURAL RESS MANAGEMENT PROJECT
PROJECT OF DEPOLLUTION OF LAKE "BIZERTE"
OTEDD - MRE CCA - AGRICULTURE SECTOR
MRE CCA
Int. WS MEXICO MRE CCA
STUDY TRADITIONAL KNOW-HOW CCA IN LOCAL LEVEL
INVENTORY OF METHODS
6 METHOD BRIEFS
VULNERABILITY ASSESSMENT
OLIVE TREE PRODUCTION SYSTEM
CORK OAK ALFA STEPPE RANGELAND ECOSYSTEMS
CLIMATE INFORMATION AND SERVICES
METADATA CATALOG SYSTEM ON CC TUNISIA
TRAINING ON METADATA CATALOG (6 Institutions)
CLIMATE PROOFING MANAGEMENT PLAN OF "SAOUAF" FARM
WEB/NAR (CIS - Series)
MAINSTREAMING ADAPTATION TO CC
INTEGRATING CC INTO LOCAL DEVELOPMENT
TRAINING IN CLIMATE MODELING (DWD)
CONSTRAINTS TO ADAPTATION
LACK OF INTERSECTORAL COORDINATION
LACK OF AWARENESS OF DECISION MAKERS
WEAKNESS OF CIVIL SOCIETY ROLE
POLTICAL TRANSITION
CAPACITY BUILDING
TRAINING 5 Participants IN BERLIN Integrating CCA into Invest.
TRAINING OF TRAINERS MARRAKECH 2012 - 2 participants -

5.8 Study "Climate Change Impact Chains in Coastal Areas (ICCA)"

A mind map depicting the impact chain in coastal areas resulting from the climate pressure of tropical storms was presented by Emilia Pramova from CIFOR. It is one example of the results of the study "Climate Change Impact Chains in Coastal Areas (ICCA)" conducted by CIFOR for GIZ as part of the "*Inventory of Methods for Adaptation to Climate Change (IMACC)*" project. The objective of the ICCA study is to **understand, delineate, and communicate climate change impact chains**, as well as potential ecosystem-based adaptation practices in coastal areas with a special focus on Indonesia and the Philippines. The study is conducted in two components:

(1) Global literature review covering coastal areas and especially mangrove and coral socio-ecological systems;
(2) Country document review (policies, projects and programmes) and expert interviews for Indonesia and the Philippines.

The impact chains are constructed based on the results from the global literature review (component 1). Impact chains are elaborated for the following climate pressures: tropical storms, sea-level rise, ocean warming, acidification, sea-surface temperature (SST) increase, and floods. Each impact chain contains information on the different direct and indirect effects of a particular pressure in coastal areas, and especially in mangrove and coral socio-ecological systems. The information is derived from the case-studies discussed in the literature analysed, including adaptation or coastal management recommendations wherever mentioned. The **example of the tropical storms impact chain is attached in annex 2**.

The study will be finalized by September 2013 and will be uploaded to AdaptationCommunity.net. Results will be presented in a webinar as well.

For further information please contact Emilia Pramova at E.Pramova@cgiar.org.

5.9 GIZ-OECD Adaptation Training

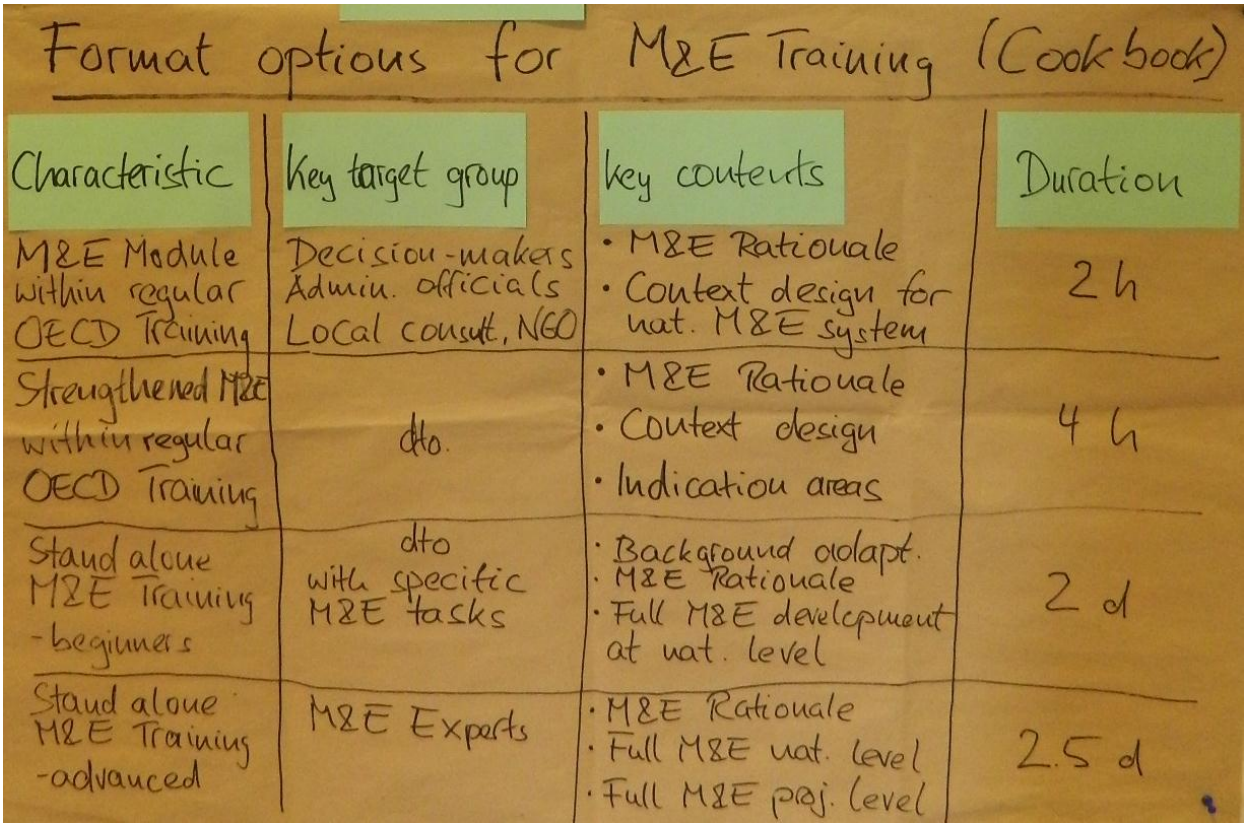
Capacity building for adaptation is an often voiced need. GIZ has developed a training programme that is based on the OECD Policy Guidance "*Integrating Climate Change Adaptation into Development Co-operation*". It is available in English, French and Spanish and consists of the following modules:

Module 1:	Apply a climate lens
Module 2A:	**Understand climate science (Former Module 2)**
Module 2B:	**Find climate information on ci:grasp**
Module 2C:	**Manage uncertainty**
Module 3:	Assess vulnerability
Module 4:	Identify adaptation options
Module 5:	Select adaptation measures
Module 6:	**Introduction to adaptation M&E**
Module 6A:	**Adaptation M&E at national level**
Module 6B:	**Adaptation M&E at project level**
Module 7:	Develop institutional capacity
Module 8:	Local climate stresses, vulnerability and resilience
Module 9:	Take action at local level and beyond
Module 10:	Integrate adaptation into the project cycle

Barbara Fröde-Thierfelder from eco-consult and Alfred Eberhardt from cde-consult, both experienced trainers, introduced the training and its main modules (see graphic with key train-

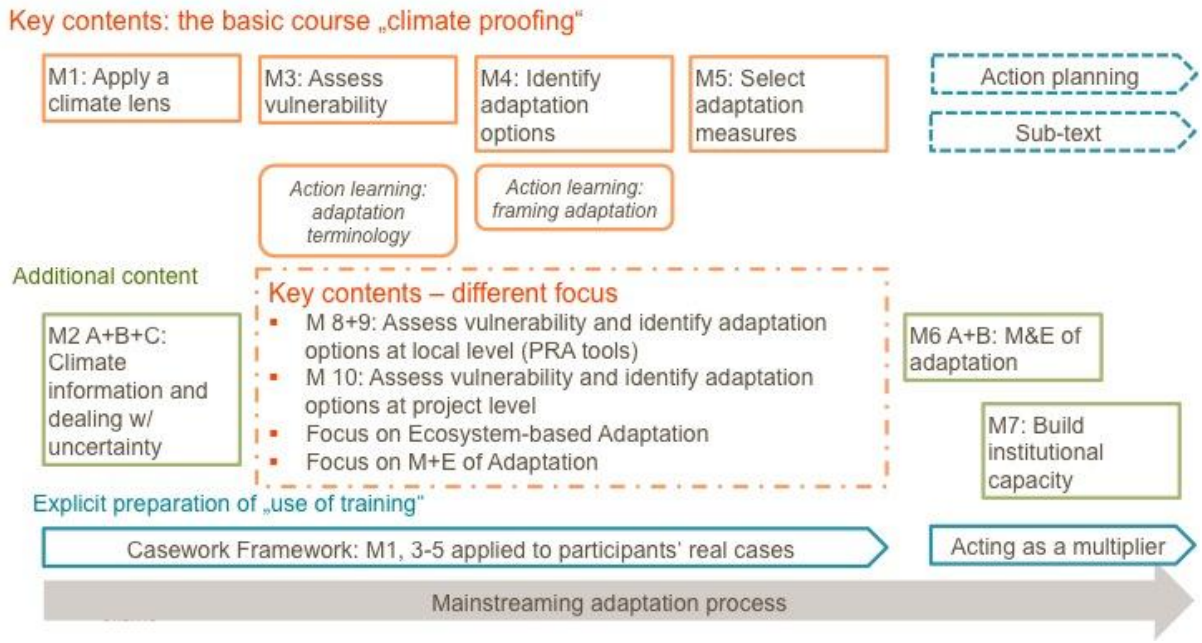
ing contents below) focusing those modules that were newly developed by the IMACC project. Following the revision and extension of the existing module 2 (to 2 A, B and C) on **climate information** by IMACC, recently, new modules (as an revision and extension of module 6 of the existing training) on **Monitoring and Evaluation** of adaptation have been developed that share the latest knowledge on adaptation M&E at national as well as project level. A successful test-training of the new M&E modules took place in Mexico early May with representatives of IMACC partner countries. The modules can be conducted in combination with the main modules of the GIZ-OECD training or as stand-alone M&E training (see table below). Details are described in this factsheet.

Overview on format options for the M&E training course



IMACC has also developed a so-called "**cookbook**" that provides an **overview of the different training formats** ("Tailor made training courses on climate change adaptation – a cookbook for different formats and target groups", available at AdaptationCommunity.net ➜ "Knowledge" ➜ "CCA Training soon). It supports the design of a training course, i.e. different module combinations to best fit a particular training purpose and target audience (see figure below). For further questions about the adaptation training please contact Michael.Hoppe@giz.de.

Overview of training modules of the GIZ-OECD CCA training course



6. Working Groups

In the afternoon of the second workshop day, four parallel working groups took place. Discussions and results of the working groups are depicted below. Presentations of working group results took place in the morning of the third and final workshop day in a **webinar** that was streamed via AdaptationCommunity.net (please follow this link to the **recording** and forward to minute 3:30 to start).

6.1 Climate Information and Services

The working group on Climate Information & Services focused on the challenges and cooperation between users and providers of climate information.

Michael Hoppe, project leader of IMACC, summarized the challenges in providing climate services (i.e. availability and accessibility of data and information, management of information, user-orientation, uncertainties, coordination of roles in countries) and showed examples of country and global activities tackling these challenges that were presented during a Discussion Series on the topic on AdaptationCommunity.net.

Prof. Dr. Maria Mañez from the Climate Service Center (CSC) explained that science can inform about global emission scenarios, possible future changes in the climate system through global and regional climate models and multi-model ensembles. This information generation is mainly top down and needs to be supplemented by bottom up information (e.g. observed local trends and impacts) as well as socio-economic data in order to fully understand local impacts and vulnerability – and thus to comply with the attributes of a climate service . To achieve this, professional communities from all fields need to cooperate.

Participants presented how climate information provision is done in practice:

- **Philippines**: *Agnes Balota*, GIZ Philippines (Support to the Climate Change Commission Project), presented how demand for climate information at the national level was created by budget policy directives from the current administration. She also shared how the provision of climate information is increasingly becoming the domain of non-state actors in the Philippines and how climate information is used for adaptation decision-making at local levels through climate proofing of mandated local government land use plans and comprehensive development plans. Ms Balota also referred to a practical manual on how to prepare climate information for local level adaptation action, developed by GIZ-Philippines.
- **Germany**: *Prof. Dr. Lutz Katzschner* from the University of Kassel and the KLIMZUG-Northern Hessen “Regional network for climate change adaptation”, presented an interactive map table that calculates and visualizes changes in climate parameters and serves as basis for discussion among planners. He also presented a set of thematic maps accompanied by a guideline that explains which maps to use when looking at different fields of intervention.
- **Indonesia**: *Erwin Makmur* from the Indonesian Met Service (BMKG) showed a series of routine products already provided by BMKG (e.g. maps of shifts of wet and dry season onset, vulnerability map to drought for rice producing provinces, among others) and explained the climate field school activities which are meant to bridge the gap between cli-

mate information provider and end users. This approach assists in interpreting and translating technical and scientific climate information into actions in the field.

Main points during the discussion of the cases were:

- **Access and availability of data** is still an important issue **to be solved** in most countries.
- Besides the question of customizing climate information to the needs of the user, **quality assurance** was another important point. For achieving the highest credibility of information possible, **rules/standards for certification need to be applied**. These could be provided by international networks such as the CSP (Climate Service Partnership) or the CKB (Climate Knowledge Brokers) Group as well as regional or national clearing houses.
- For meeting the user needs it is vital to **establish a long term provider-user-dialogue.**

Based on the three practical examples, a **draft checklist** with **key questions** to be answered when preparing climate change information for adaptation planning, implementation and monitoring was refined. The checklist can be found in **annex 1**.

What's next?

Topics to be followed up by the group (see also the recording of the webinar):

- **Certification and quality standards for climate information & services**:
  - How to move forward at national and regional levels?
  - How to link to existing global initiatives such as the Climate Knowledge Brokers (CKB) Group and the Climate Service Partnership (CSP)?
- **User-provider-relationship:**
  - How to build a continuous and honest working relationship?
- **Finalizing the checklist with key questions to be answered when preparing climate change information for adaptation planning.**

For further questions please contact Michael Hoppe from the IMACC team at Michael.Hoppe@giz.de

6.2 Mainstreaming Adaptation

The working group on Mainstreaming looked at processes and examples of mainstreaming adaptation at national and sub-national level. Its objective was to discuss and agree on a set of recommendations for mainstreaming adaptation based on experiences made in IMACC countries.

An introductory presentation to the topic by the facilitator Alfred Eberhardt illustrated the rationale and wealth of methods to mainstream adaptation. Mainstreaming aims to systematically consider climate risks and adaptation in decision making and planning processes. Two examples from IMACC countries illustrated how certain aspects of mainstreaming can be promoted in practice:

- **India**: *Lokendra Thakkar, Government of Madya Pradesh, and Anna Kalisch, GIZ Climate Change Adaptation in Rural Areas of India (CCA-RAI)*

The focus of this approach is customized capacity development to support the implementation of National and State Action Plans for Climate Change (NAPCC/SAPCC). Training of Trainer (ToT) events have built a cadre of trained human resource that actively multiply the knowledge by training further staff.

- **Indonesia**: *Budi Chairuddin, Programme Coordinator Asian Cities Climate Change Resilience Network*
  Mainstreaming CC at local level was promoted successfully in Central Java by establishing city CC teams including administration and NGOs. Key prerequisites for successful mainstreaming included commitment by the city leadership, continuing also beyond election periods. Vulnerability assessments were highly useful to demonstrate how strongly the cities are affected.

Following these presentations, a set of **draft recommendations for mainstreaming** were discussed with the group together with the assumptions under which they hold. Whilst mainstreaming methods are context specific, recommendations can point to key factors that influence the mainstreaming process. The working group resulted in a refined set of recommendations that are presented below. The following questions for future debate were identified:

- Better understanding framework conditions, e.g. link of practical application and UNFCCC (Art. 6),
- Exchange on and learning from concrete experiences, e.g. by collecting good practice examples,
- Learning from experiences in similar areas of mainstreaming, e.g. with Environmental Impact Assessment or Strategic Environmental Assessment,
- Improving methods and processes, e.g. “Does mainstreaming bring about new ideas?”

What’s next?

The **recommendation paper** on mainstreaming can be found **in annex 4** (see also the recording of the webinar) and was also uploaded to AdaptationCommunity.net (Mainstreaming ➜ Further Reading) to inform further discussion. Representatives from IMACC partner countries are encouraged to share good practices and examples of mainstreaming and the IMACC team is happy to support their documentation.

For further questions please contact Michael.Hoppe@giz.de.

6.3 Monitoring and Evaluation of Adaptation

The working group on Monitoring and Evaluation looked at processes and approaches of monitoring adaptation at national-level. An introductory presentation to the topic by the facilitator Timo Leiter illustrated the rationale and challenges of adaptation M&E and highlighted the need for tailor-made M&E arrangements in light of different contexts. The development process of adaptation M&E systems in four IMACC countries was presented:

- **Mexico**: *Sofia Munoz, GIZ Mexican German Climate Alliance*
  Mexico's climate change law (2012) mandates the development of an M&E system. A national workshop bringing together respective ministries at federal level took place early May 2013 and a first draft of a study outlining possible steps to developing an M&E system is available.
- **South Africa**: *Tsepang Makholela, Department of Environmental Affairs (DEA)*
  South Africa's National CC Response White Paper demands the development of a draft CC response M&E system by October 2013. DEA has started stakeholder consultations and commissioned studies to outline possible M&E system designs.
- **Tunisia**: *Samira Nefzi, Observatory for Environment and Sustainable Development (OTEDD)*
  OTEDD has identified the agricultural sector to pilot adaptation M&E based on a set of indicators which are being developed this year. They will focus on vulnerability and adaptation measures.
- **Philippines**: *Helena Gaddi, Climate Change Commission*
  Adaptation indicators are currently being developed based on results chains for each of the seven strategic priorities outlined in the National Climate Change Action Plan.

The following **key issues for continued exchange** emerged from the discussion:

- Measuring effectiveness of adaptation beyond tracking activities
- Integration with existing systems / limiting the burden of additional reporting
- Access to data from different institutions
- Making use of M&E results to benefit the adaptation process / inform policy

An innovative approach is being considered in the Philippines: integrating adaptation into the performance system that steers the budget allocation process at sub-national level. This would incentivize adaptation actions. The challenge from an M&E perspective is to develop performance indicators that match the reporting timeframes.

What's next?

- Results of the working group have been integrated into a recommendation paper on adaptation M&E based on experiences of IMACC countries in setting up national-level adaptation M&E systems. Comments on the draft paper are welcome;
- The new M&E training modules that form part of the OECD training programme "Integrating Climate Change Adaptation into Development Planning" will be available by October 2013 on the OECD website;
- Exchange on M&E emerged as a priority interest among countries. Members of the working group on M&E could act as key points of contact.

For further questions please contact Timo.Leiter@giz.de.

6.4 Climate Risk Index / Transition Pathways

The working group on the Climate Impact Index and the Transition Pathways concept looked at how climate impact and adaptation, sustainable development, livelihood and climate mitigation are interconnected and discussed related, country specific strategies. To do so, three concepts were introduced by Jürgen Kropp and Dominik Reusser (PIK) and discussed with the group participants:

Climate Impact Index: Climate change vulnerability and the consequent need for adaptation are unevenly distributed in the world, with many developing countries especially vulnerable to changes in climate. Often less developed countries are more dependent on climate sensitive sources of income, while resources to cope with impacts are limited in terms of budget as well as knowledge. Climate change often adds on to other conditions that are responsible for low levels of social and economic welfare, increasing the vulnerability of such systems. Climate impacts may substantially reduce the adequacy of livelihood conditions, if adaptation and coping strategies are insufficient. Thus, climate change has to be related to the specific societal contexts. Integrating results from sectoral impact and vulnerability analyses with other societal conditions and understanding the combined impact on livelihood elements is challenging, because existing knowledge on expected impacts remains unconnected to the consequences that these impacts may have for societal structures beyond sectoral consequences. To identify adaptation needs and prioritize fields of action, assessment methodologies are needed, which allow viewing the social-environmental interface. The climate impact index is a tool to address these challenges.

Sustainability Transition: In order to move towards more sustainability, relating expected climate impacts to livelihood conditions is only the first step. We need to change the ways our societies operate. While basic livelihood conditions need to be fulfilled, what is needed are ways to increase people's well-being without ever increasing consumption. In addition to the decoupling of well-being and economic activity, we also need to decouple economic activity from resource utilization. To achieve this, we need a concerted change in multiple sectors and at multiple levels. This is investigated in the research on sustainability transition, e.g. by the Sustainability Transition Research Network. For a set of selected countries it is planned to defined prospective futures and assess their trade-off when following different development pathways.

Triple-win strategies: A societal transition needs experimentation on new ways to organize our society. A good starting point to do so are strategies that look at an improvement of the conditions in terms of greenhouse gas emission mitigation (M), adaptation to impacts from climate change (A) and progress in development in agreement with sustainability (D), so called triple-win strategies. Successful triple-win strategies may inform ways forward in the transition process. Participants introduced some of the triple-win strategies they knew from their context:

- Strengthen local markets (M: reduce transport, A: increase social capital – an important adaptation capacity, D: stabilize the local economy);
- Sustainable financing mechanisms of local communities (M: rehabilitation of mangroves; A: protect fish stocks; D: incentives for farmers);

- Forest corridors (M+A: reforestation through agro-forestry; D: products from agro-forestry);
- Strengthened local farming community with rooibos tea (A: understand heat stress to lifestock; D: better conditions for farmers);
- Experiments with zero-tillage (M: less petrol use, A: better soils and better water storage, D: better conditions for farmers);
- Blue Economy and Green Growth strategies (M: support financing of carbon efficient infrastructure; A: require adaptation plans, D: create trust for outside investors, while maintaining local management).
- The concepts and discussion stimulated new ways of thinking about adaptation to climate change. During the discussion, barriers that may hinder the upscaling of existing triple-win activities were identified: Costs and lack of funds; technological lock-in; innovation driven by expected financial benefits; protective actions of large players and unfair competition; lack of political support; barriers in mind.

Ways forward:

- The emerging topics in research need a continued dialogue to challenge and inspire the current practices, but also to adjust concepts and tools from science to the needs of practitioners.
- Specific points include:
    - Importance to match the method to the question at hand: required recommendations for the macro-level are different from those at the micro-level
    - Clear terminology is of high importance
    - Find a method to validate the Climate Impact Index. The challenge is to find appropriate data against which to validate the index
    - The sharing of ideas is an important mental energy source – keep the process going
    - A number of funding challenges: mainstreaming of climate change into funding agencies (example of the Philippines); technology transfer funds needed
    - Great interest for methods to manage transition processes

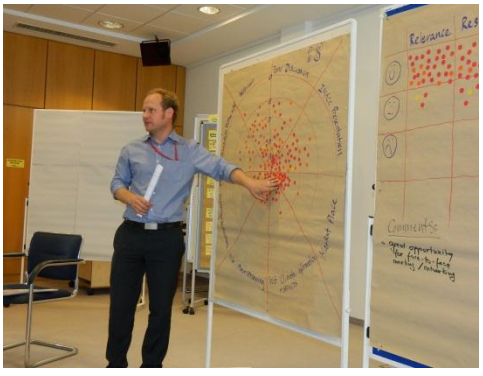
7. Reflections on the Way Forward

At the end of the workshop, participants were invited to reflect upon the questions "*which opportunities for further discussion and learning from each other would you like to take in the future?*" in country groups. The presentation of the results of this discussion revealed that the exchange across partner countries initiated by the IMACC project needs to be continued in the future.

It became clear that the topic of monitoring and evaluation of adaptation was of great interest to all countries represented in Bonn. Concrete activities for further knowledge sharing and learning with the support of – but also beyond – the IMACC project were agreed upon as depicted in the table below. The IMACC platform AdaptationCommunity.net will continue to provide a hub for exchange, documentation of adaptation experiences and webinars.

What	Who	How
Philippines		
M+E: Key performance indicators for mainstreaming CCA process	Department of Budget and Management (DBM) & Climate Change Commission (CCC)	Through the National Climate Change Action Plan and the work on adaptation M&E; with Mexico
Climate information & services certification	Department of Science and Technology (DOST) & CCC with community of practice & consortia	In collaboration with the Climate Service Centre (CSC)
Triple win transition	Department of Environment and Natural Resources & CCC	In collaboration with PIK
Mexico		
Climate Change communication at all levels (creative and innovative)	PIK; Secretaría de medio ambiente y recursos naturales (SEMARNAT, Ministry of Environment and Natural Resources); public sector and NGOs	Webinar on communicating Climate Change (e.g. earth book); create material (video) from experiences of some/all countries
Projects on the ground (agriculture, ecosystems)	Indonesia: climate information; South Africa & Tunisia: community-based adaptation; Peers in Mexico: Met. Service, adaptation people in SEMARNAT, operatives in ministries	Visit projects on the ground and see practical examples (capacity development)
Incorporate mainstreaming (key entry points)	Philippines: watershed management; Mexico: CONAGUA – operation CONANP	Share documents; learn more about the Philippines' Climate Change Commission and its structure
South Africa		
Sharing of development of a M&E systems	all	Email-exchanges, webinar in ~6 months
Exchange on community of practice	Philippines and others who are interested	Email exchange and maybe a webinar & linking websites
Sharing of experiences from South Africa	South Africa community of practice	Method briefs

Grenada		
Learning from other CCA institutional structures (committees, networks etc.)	South Africa; Mexico; Philippines	Documentation; telephone conference; email
Process of establishing a M&E system	South Africa / Tunisia; CCA M&E focal point	Documentation (list of steps); personal exchange; use of website
Preparation of the annual "State of the environment" report (focus on CCA)	Tunisia, focal point for report	Structure; template; baseline; process of data collection
Tunisia		
Exchange on approach for CCA indicators	Observatory for Environment and Sustainable Development (OTEDD)	Exchange visit with Philippines
Exchange on CC institutional and regulatory framework	Environment Department Tunisia with Mexico	Adaptationcommunity.net; Email exchange; invitation to Tunisia
Promoting AdaptationCommunity.net in Tunisia	IMACC/GIZ	National workshop
India		
Country and sector specific framework for M&E	Ministry of Environment and Forests (MoEF)/states, GIZ	Study/consultation: methodologie & indicators
Country specific inventory of adaptation options and best practices	Mexico, Philippines, all	E-network of IMACC partners; webinars, website, email
Indonesia		
Met/climate services	Philippines	Webinar Exchange visit Training
Integrating DRR&CCA	Mexico	
M&E	Tunisia	



Annex 1 Draft checklist questions for preparing climate information

Draft checklist – Questions to be answered when preparing climate change information for adaptation planning, implementation and monitoring

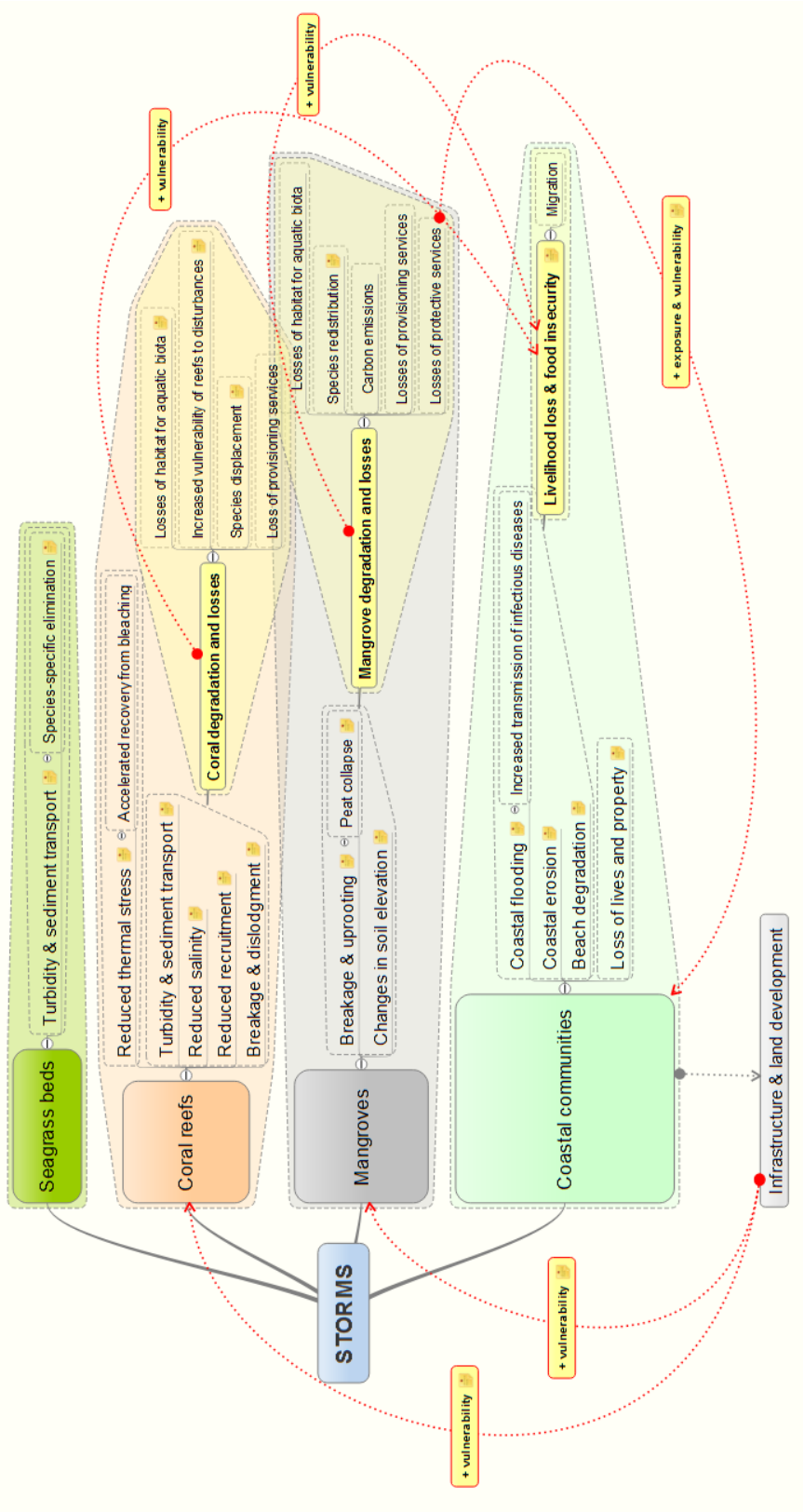
- ✓ **Purpose: climate information for what?**
  - What are the questions to be answered with the information?
  - What sector and industry is concerned? (link to impacts)
  - What geographical or administrative units/level is concerned?
  - Which planning stage (planning, implementing, monitoring, evaluating) provides an entry point?
  - What scale of data is needed / available for the unit/planning stage?
  - Which time frame (historical date, projections) and which time scale?

- ✓ **Users: climate information for whom?**
  - Who is responsible for planning adaptation and decision making in the respective sector (private and public) /industry/planning offices or at the respective level of government, i.e. who will use the information?
  - How is the information infrastructure of the potential users (technology etc.)?
  - What are capacities of those in charge of adaptation action for understanding and apllying climate change information?
  - Have users and providers of information entered into a dialogue?
  - Have users contributed to defining information needs? Are users of information involved in the compilation and/or generation of the information? How have users been involved in the compilation of information/services?
  - How much climate “service”, i.e. explanation and assistance in interpretation, does the information user need for understanding and using the climate information?
  - ➢ Do users know what information providers can provide?

- ✓ **Providers: where to obtain climate information?**
  - What global, regional and national sources exist and who are the providers?
  - What tools exist for the generation of climate information?
  - Who are the ‘brokers’ of the information?
  - Is downscaled data available? If not, are there capacities to deal with this nationally/regionally?
  - How do different providers cooperate and connect information?
  - What are the capacities and resources of those compiling and generating information?
  - Who are the official / mandated providers?
  - Is the climate information data available and accessible to the providers?
  - ➢ Do providers know what information users can use?

- ✓ **Bridging: how to find the “right” information and how is it presented?**
  - How do service providers advertise their products/services? How do they show their credentials / that they are credible source?
  - Are there standards for the information?
  - Who can provide orientation on the credibility and quality of data (nationally, regionally, globally)?
  - How do providers approach users? Do users demand services from providers?
  - How are providers and users brought together?
  - How is information presented? What formats/visualisations of information are common and available (in the country)? Do they meet user needs? Who can help to interpret?
  - How is the level of uncertainty evaluated and communicated by providers?
  - Are implications for adaptation planning and implementation indicated?

Annex 2 Impact Chain: Storms in coastal areas



Preview from the study conducted by CIFOR on impact chains for coastal areas. The final study will be available on AdaptationCommunity.net by end of 2013.

Annex 3 Recommendation paper on Mainstreaming Adaptation

Key recommendations

1. **Mainstreaming vs. Stand-alone:** Mainstreaming and 'stand-alone' adaptation measures are not mutually exclusive. Even if ambitious adaptation programmes and activities are implemented, the CC vulnerabilities of sector policies and measures should be reduced within a mainstreaming approach.

   The focus on co-benefits for the sector policies and on cost-benefit calculations (preventive adaptation measures are cheaper than damages from climate change) can support coherence of the plans and acceptance by sector agencies. The reflection of CC into overarching plans such as the National Development Plan can trigger mainstreaming on a broader basis. Also a 'mainstreaming overkill' (CCA, gender, poverty, environment, sustainability…) could be avoided through highlighting how adaptation helps also to achieve goals of sector policies.

2. **Planning framework for mainstreaming:** CC Adaptation Strategies or Plans are supportive for cross-sectorial adaptation mainstreaming. However, even in countries without an Adaptation Strategy mainstreaming is necessary and possible. Adaptdation Strategies / Plans should include M&E and be linked to performance indicators to support accountability for the mainstreaming process.

3. **Leadership commitment:** For all mainstreaming approaches, it seems to be crucial that the top level decision-makers (president, sector heads, etc.) are in favor of or even demand CC mainstreaming. Highest priority should be given to solicit this political support. A focus on co-benefits and the communication of success stories of adaptation can support leaders to set CCA high on the policy agenda.

   A challenge may be the long-term continuation of CCA commitment beyond the legislative periods / elections. A legal framework as well as accountability through transparency and public involvement can support sustainability of the CCA focus.

4. **Supportive institutional / organizational framework:** Certain requirements for mainstreaming (e.g. a mandatory Climate Proofing for certain plans, Climate Check for certain projects) and an organizational framework (e.g. climate change commission, the inclusion of adaptation experts in planning bodies) can strongly promote mainstreaming across sectors.

   Mainstreaming should be further supported by operationalising it through implementation plans, reflection in job descriptions, nomination of focal points and the like.

5. **Support services for mainstreaming:** Quite often, sectors are reluctant against CC mainstreaming. This is understandable with a view to a potential overload of cross-cutting issues and therefore a mainstreaming fatigue. And CC mainstreaming is especially challenging due to the complexity of themes and uncertainty of future CC scenarios. Therefore, support mechanisms such as help desks or special funds to buy-in support can help sectors to overcome these problems.

6. Funding mechanisms are a crucial element for supporting mainstreaming. This refers to specific Adaptation Trust Funds such as established in first countries as well as the reflection of adaptation in large existing funds. In general, the Ministry of Finance has a crucial role for support mechanisms.

7. **Capacity development:** Experts but also decision-makers in the sectors benefit from trainings on how to mainstream adaptation in their respective sector fields. However, trainings should be linked to other support processes such as help-desks in line with the needs of support on demand (see point 5).

   It is most important to link training to the real-work challenges of the trainees. Therefore, the focus should be on practice oriented knowledge and real case reflections. Also awareness building for the broader public is supportive to mainstreaming.

8. **KISS – Keep it straight and simple:** Mainstreaming requirements and tools should not be made to complex / difficult. Quite often, also comparably simple tools such as Climate Proofing can improve mainstreaming significantly.

   Adaptation tools and argumentations should not be too scientific but be made 'understandable' for sector practitioners. Further development of streamlined tools is needed.

9. **Involvement and participatory processes:** Mainstreaming usually requires the interaction of different responsible institutions and stakeholders. Participatory processes should ensure that everybody gets involved and has the chance to develop ownership for adaptation processes. Broad stakeholder involvement will enhance also commitment at political level.

A PDF of these recommendations can be downloaded at AdaptationCommunity.net under Mainstreaming ➜ Further reading.

Annex 4 Publications and project results by PIK

The following paragraphs provide further details on publications developed by the Potsdam Institute for Climate Impact Research (PIK) in relation to three topics:

- Transition
- Climate impact index
- Ci:grasp

Transition

A Human Development Framework for CO2 Reductions

Although developing countries are called to participate in CO2 emission reduction efforts to avoid dangerous climate change, the implications of proposed reduction schemes in human development standards of developing countries remain a matter of debate. We show the existence of a positive and time-dependent correlation between the Human Development Index (HDI) and per capita CO2 emissions from fossil fuel combustion. Employing this empirical relation, extrapolating the HDI, and using three population scenarios, the cumulative CO2 emissions necessary for developing countries to achieve particular HDI thresholds are assessed following a Development As Usual approach (DAU). If current demographic and development trends are maintained, we estimate that by 2050 around 85% of the world's population will live in countries with high HDI (above 0.8). In particular, 300 Gt of cumulative CO2 emissions between 2000 and 2050 are estimated to be necessary for the development of 104 developing countries in the year 2000. This value represents between 20 % to 30 % of previously calculated CO2 budgets limiting global warming to 2°C. These constraints and results are incorporated into a CO2 reduction framework involving four domains of climate action for individual countries. The framework reserves a fair emission path for developing countries to proceed with their development by indexing country-dependent reduction rates proportional to the HDI in order to preserve the 2uC target after a particular development threshold is reached. For example, in each time step of five years, countries with an HDI of 0.85 would need to reduce their per capita emissions by approx. 17% and countries with an HDI of 0.9 by 33 %. Under this approach, global cumulative emissions by 2050 are estimated to range from 850 up to 1100 Gt of CO2. These values are within the uncertainty range of emissions to limit global temperatures to 2uC.

Available as: Costa L, Rybski D, Kropp JP (2011) A Human Development Framework for CO2 Reductions. *PLoS ONE* 6(12): e29262. doi:10.1371/journal.pone.0029262

Collaborative modelling of the interdependence of mitigation, adaptation, and development

Managing the interdependence of climate mitigation, adaptation and sustainable development requires a good understanding of the dominant socio-ecological processes that have determined the pathways in the past. In a collaborative modelling exercise with the environmental administration from Mexico and the spatial planning centre from Indonesia, we are developing two country-specific system dynamic models to describe the most relevant processes with respect to balancing mitigation, adaptation and development. In a first workshop in November 2011 interested stakeholders from the ministries were introduced to the method and relevant sectors have been identified. In an iterative process, key variables, the interdependencies between the variables and the resulting dynamics will be discussed and tested with respect to the ability to reproduce past dynamics. We will report about the experience in this ongoing process and present the current state of the resulting dynamic model along with first, preliminary results. We will also present some of the feedback from the participants in the Ministries with respect to the applicability of the resulting model.

Available as: Reusser, Dominik E., Flavio Siabatto, Tabea K. Lissner, and Jürgen P. Kropp. 2012. “Collaborative Modelling of the Interdependence of Mitigation, Adaptation and Development.” In 6th International Congress on Environmental Modelling and Software - iEMSs 2012.

Interdependence of mitigation, adaptation and sustainable development

Managing the interdependence of climate mitigation, adaptation and sustainable development requires a good understanding of the dominant socioecological processes that have determined the pathways in the past. Key variables include water and food availability which depend on climate and overall ecosystem services, as well as energy supply and social, political and economic conditions. Global availability of such data will be discussed. The goal is to derive possible future scenarios and test those for their compatibility with sustainability boundaries. Where dynamics go beyond sustainability boundaries intervention points in the dynamics can be searched. To this end, we are building a system dynamics model describing the socio-ecological development for a number of case study countries. Extensions of the existing, simple Wonderland Model will be our starting point and we will discuss possible components dealing with demographic development, non-equilibrium economic dynamics as well as human well-being. Their connection to the natural environment and our approaches to include this in the model will be presented. We expect to present first results about our ability to reproduce the dynamics observed in the case study countries as well as first attempts of projections into the future.

Available as: Reusser, Dominik E., Anselmo Garcia Cantu Ros, Flavio Augusto Pinto Siabatto, Christian A. Pape, Tabea K. Lissner, and Jürgen P. Kropp. 2012. “Interdependence of Mitigation, Adaptation and Sustainable Development.” In 6th International Congress on Environmental Modelling and Software - iEMSs 2012

Embodied Greenhouse Gas Emissions in Diets

Changing food consumption patterns and associated greenhouse gas (GHG) emissions have been a matter of scientific debate for decades. The agricultural sector is one of the major GHG emitters and thus holds a large potential for climate change mitigation through optimal management and dietary changes. We assess this potential, project emissions, and investigate dietary patterns and their changes globally on a per country basis between 1961 and 2007. Sixteen representative and spatially differentiated patterns with a per capita calorie intake ranging from 1,870 to 3,400 kcal/day were derived. Detailed analyses show that low calorie diets are decreasing worldwide, while in parallel diet composition is changing as well: a discernable shift towards more balanced diets in developing countries can be observed and steps towards more meat rich diets as a typical characteristics in developed countries. Low calorie diets which are mainly observable in developing countries show a similar emission burden than moderate and high calorie diets. This can be explained by a less efficient calorie production per unit of GHG emissions in developing countries. Very high calorie diets are common in the developed world and exhibit high total per capita emissions of 3.7–6.1 kg CO_2eq./day due to high carbon intensity and high intake of animal products. In case of an unbridled demographic growth and changing dietary patterns the projected emissions from agriculture will approach 20 Gt CO_2eq./yr by 2050.

Available as: Pradhan P, Reusser DE, Kropp JP (2013) Embodied Greenhouse Gas Emissions in Diets. PLoS ONE 8(5): e62228. doi:10.1371/journal.pone.0062228

Climate Impact Index

Impacts of climate change on livelihood conditions: assessing adaptation requirements

Climate change vulnerability and the consequent need for adaptation are unevenly distributed in the world, with many developing countries especially vulnerable to changes in climate. Often less developed countries are more dependent on climate sensitive sources of income, while resources to cope with impacts are limited in terms of budget as well as knowledge. Climate change often adds on to other conditions that are responsible for low levels of social and economic welfare, increasing the vulnerability of such systems. Climate impacts may substantially reduce the adequacy of livelihood conditions, if adaptation and coping strategies are insufficient. Thus, climate change has to be related to the specific societal contexts. Sectoral impact and vulnerability analyses clearly show that climate change impacts may threaten important livelihood elements and may have severe repercussions for our current lifestyles. However existing knowledge on expected impacts remains unconnected to the consequences that these impacts may have for societal structures beyond sectoral consequences. To identify adaptation needs and prioritize fields of action, assessment methodologies are needed, which allow viewing the social-environmental interface. We present such a method, assessing the consequences that climate change impacts may have for livelihood conditions. The framework calculates resource availability for adequate livelihoods using

multi-dimensional sub-indices, thus extending existing indices with societal dimensions. To assess how climate impacts affect these livelihood conditions, country-specific information on climate change and its impacts is compiled. Sectoral impacts and changes over time and space can then be evaluated regarding their consequences for livelihood conditions. The proposed methodology depicts expected climate impacts in a comparable way, making progress towards prioritizing adaptation needs.

Available as: Lissner, Tabea K., Caroline Sullivan, Tobia Lakes, Dominik E. Reusser, and Jürgen P. Kropp. 2012. “Impacts of Climate Change on Livelihood Conditions: Assessing Adaptation Requirements.” In Climate Adaptation in Action 2012. Melbourne.

Climate change impacts on livelihoods: a fuzzy logic quantification

Climate change will will directly and indirectly affect human livelihoods. While fragmented information on sectoral impacts is increasingly available, an integrative framework to assess the overall consequences of climate impacts on livelihoods is currently missing. We fill this gap by introducing the livelihood index, which provides a comprehensive set of relevant livelihoods elements based on established approaches and measures of human livelihoods and well-being. The livelihood index is quantifiable and applicable in interdisciplinary fields, such as climate change and sustainability research. It targets at the identification of efficient response options to improve livelihoods. The diverse elements of livelihood can be consistently integrated through the use of a fuzzy logic approach, which retains the important contextual aspects within the results. Global livelihood conditions at country-level are investigated as a demonstration of the approach. Future changes in water availability over the course of the century as projected in several climate change scenarios strongly influence the livelihood index in many countries. However, global mean values show little change, underlining the importance of disaggregated and regionalized analyses. The publication is in preparation.

New modules in ci:grasp (a selection)

City module - The global potential of local peri-urban food production (global, city level)

One big challenge of the 21st century is and will be massive urbanization. It is expected that more than 7 out of 10 people will live in a city by 2050. Crucial developments towards a sustainable future will therefore take place in cities. One important approach for sustainable city development is to re-localize food production and to close urban nutrient cycles through better waste management. The identification of areas that can increase food production, while ensuring the sustainability of natural resources and maintaining urban needs will be a major task for cities in the future. This module describes the potential of peri-urban agriculture for 2,383 cities worldwide by determining their “carrying capacity”. It combines several worldwide data sets to determine the food consumption demand of the inhabitants and the fraction which can be met with regional food production.

City module - Urban livelihood vulnerability under rapid coastal city growth (global, city level)

A wave of unprecedented urbanization in human history is underway in a coastal band in non-OECD countries (UNDESA, 2006). Whether in Port-au-Prince in Haiti or Shanghai in China, emerging problems are compounding with unsolved long-standing ones to create a herculean management challenge for numerous coastal cities (Tanner et al, 2009). This challenge comprises different aspects of global change, such as climate change, urban sprawl, and urbanization on the one hand, and settlement distribution and natural hazards such as tropical cyclones, floods and landslides on the other. Combinations of these aspects generate vulnerability for urban livelihoods through a multitude of mechanisms, threatening both human well-being and ecosystems. Based on similarities, we present a global categorization of these mechanisms into six typical, generalized manifestations and group the areas and coastal cities they are prevalent in.

City module - City cluster and urban heat islands (Europe, will be extended)

As one of the most evident influences of human activities on climate, urbanization has significantly affected the terrestrial ecosystems and can be observed, measured and perceived through diverse indicators. Among them, and considered one of the adverse results of ongoing urbanization is a phenomenon called the urban heat island (UHI) effect, i.e. urban areas experiencing elevated temperatures relative to the surrounding countryside (Oke, 1987). Although UHI studies have been conducted in the last decades in various cities, the understanding of the mechanism of UHI needs to be updated and enhanced due to the diversity of cities. We provide an assessment of the UHI for all European cities.

Livelihood Condition Index (global national, extension is planned)

Climate change impacts do not unravel in an isolated manner, they interact with prevailing socio-economic conditions and can have detrimental effects on human livelihoods. Livelihoods are considered to be the assets required to have control over one's life. Deprivation of any of these resources would significantly reduce individual well-being and hinder adequate societal development. Livelihood conditions are defined as “the command an individual, family or other social group has over an income and/or bundles of resources that can be used or exchanged to satisfy its needs. This may involve information, cultural knowledge, social networks and legal rights as well as tools, land or other physical resources” (Wisner, Blaikie, Cannon, & Davis, 2004, p. 12).

Global Impact Maps (global, grid based, work in progress)

The outcomes of the impact model intercomparison project (ISIMIP) is planned to be integrated into ci:grasp. This was an effort of several groups worldwide. The advantage is that for predefined climatic stimuli comparable impact maps are available on a global scale. Module is under development, test of accuracy regarding the data is currently performed.

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH
Dag-Hammarskjöld-Weg 1-5
65760 Eschborn, Germany
T + 49 61 96 79 - 0
F + 49 61 96 79 - 11 15
E info@giz.de
I www.giz.de