Asia-Pacific Network for Global Change Research

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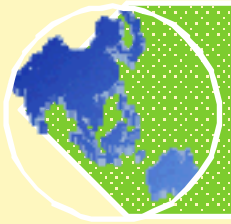
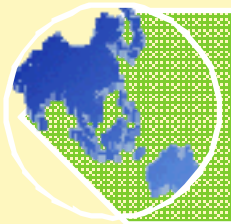
APN's Mission

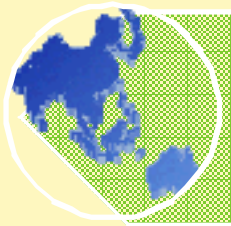
The mission of the APN is to enable investigation of change in the Earth's life support systems as it occurs in the Asia-Pacific region to:



Identify, explain and predict changes in the context of both natural and anthropogenic forcing,



Assess potential regional and global vulnerability of natural and human systems, and



Contribute, from the science perspective, to the development of policy options for appropriate responses to global change that will also contribute to sustainable development

APN's Goals

Goal 1: Supporting regional cooperation in global change research on issues particularly relevant to the region

Goal 2: Strengthening appropriate interactions among scientists and policy-makers, and providing scientific input to policy decision making and scientific knowledge to the public

Goal 3: Improving the scientific and technical capabilities of nations in the region

Goal 4: Cooperating with other global change networks and organisations

Goal 5: Facilitating the development of research infrastructure and the transfer of know-how and technology

Climate Change Challenges

- Climate change is the foremost concern particularly vulnerabilities, impacts and adaptation
- lack of human & institutional capacity & limited financial resources are the main challenges in implementing climate research
- mainstreaming climate research results into national policy

APN & Capacity Development

3 Years of Capacity Development and Research in Climate Change under CAPaBLE for developing nations in the Asia-Pacific Region

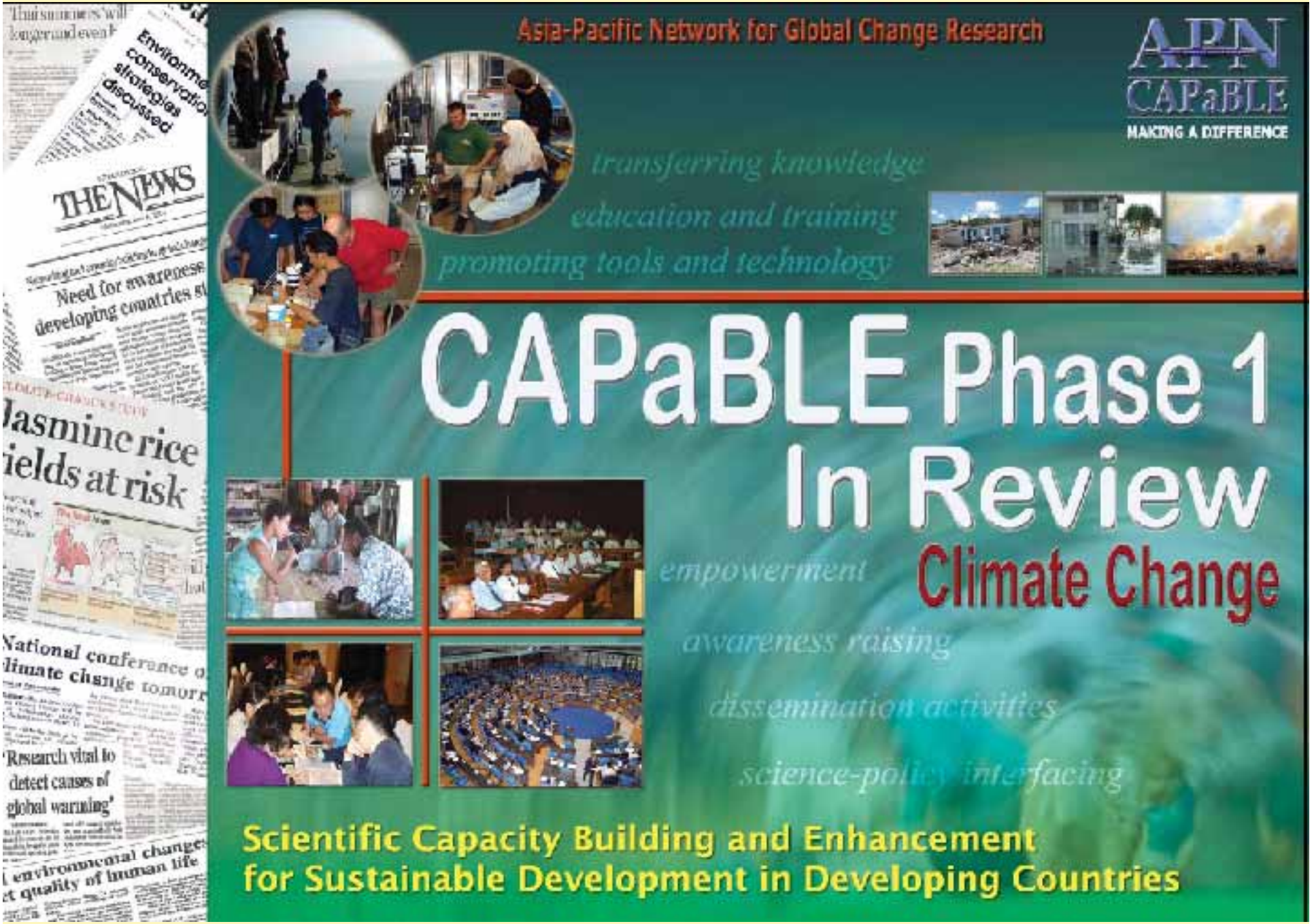
Trained over 300 scientists

Raised awareness of over 4000 people

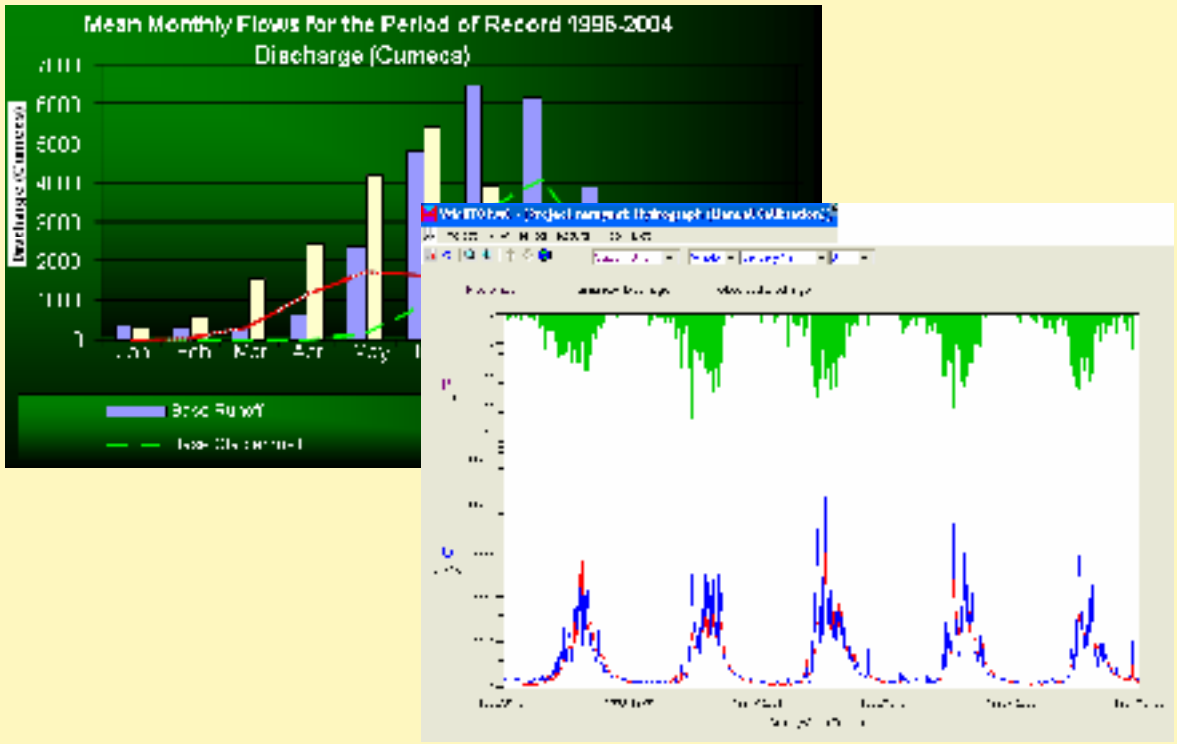
Published over 50 peer-reviewed papers

"In Review" highlights that CAPaBLE is

policy relevant, developing capacity, creating partnerships, raising awareness, promoting sustainable societies.


Asia-Pacific Network for Global Change Research
APN
CAPaBLE
MAKING A DIFFERENCE
transferring knowledge
education and training
promoting tools and technology
CAPaBLE Phase 1
In Review
Climate Change
empowerment
awareness raising
dissemination activities
science-policy interfacing
Scientific Capacity Building and Enhancement
for Sustainable Development in Developing Countries
THE NEWS
Need for awareness
developing countries
Jasmine rice
fields at risk
National conference
climate change
'Research vital to
detect causes of
global warming'

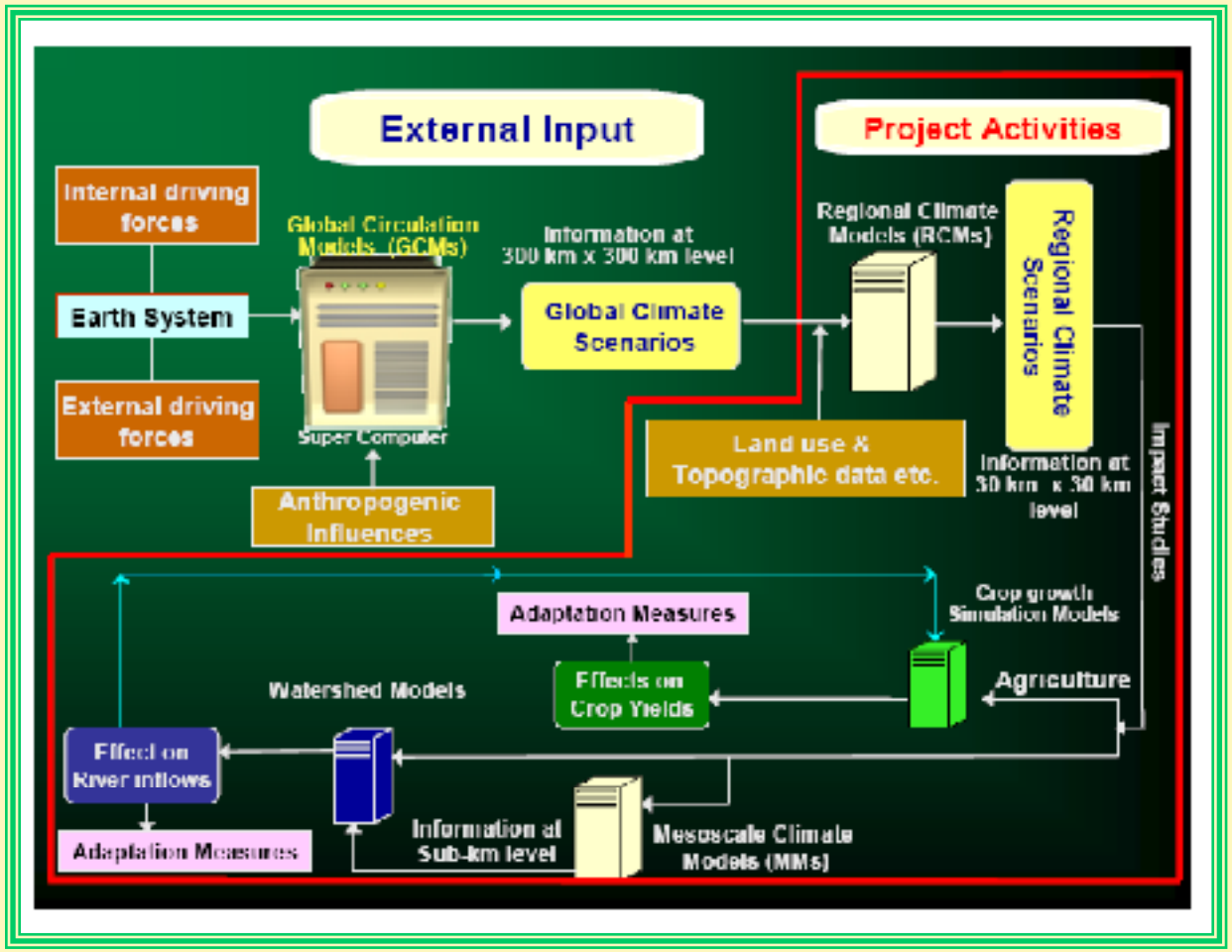
Modelling on Impacts on Food & Water Resources



- Until recently a major weakness in South Asian countries in climate change research has been the lack of expertise and experience in ***climate simulation modelling.***

- The APN project undertaken by GCISC has played a key role in ***empowering scientists from Pakistan, Nepal and Bangladesh*** to become active players with climate change researchers globally through their capacity enhancement

Modelling on Impacts on Food & Water Resources



Project Methodological Approach: Flow of Information

Modelling on Impacts on Food & Water Resources

Scientific Capacity Building: Computer Simulation Models below were acquired, implemented, validated, and calibrated by the beneficiary countries and are now being

Used by them (Pakistan, Nepal and Bangladesh).

i. Regional Climate Models (RCMs):

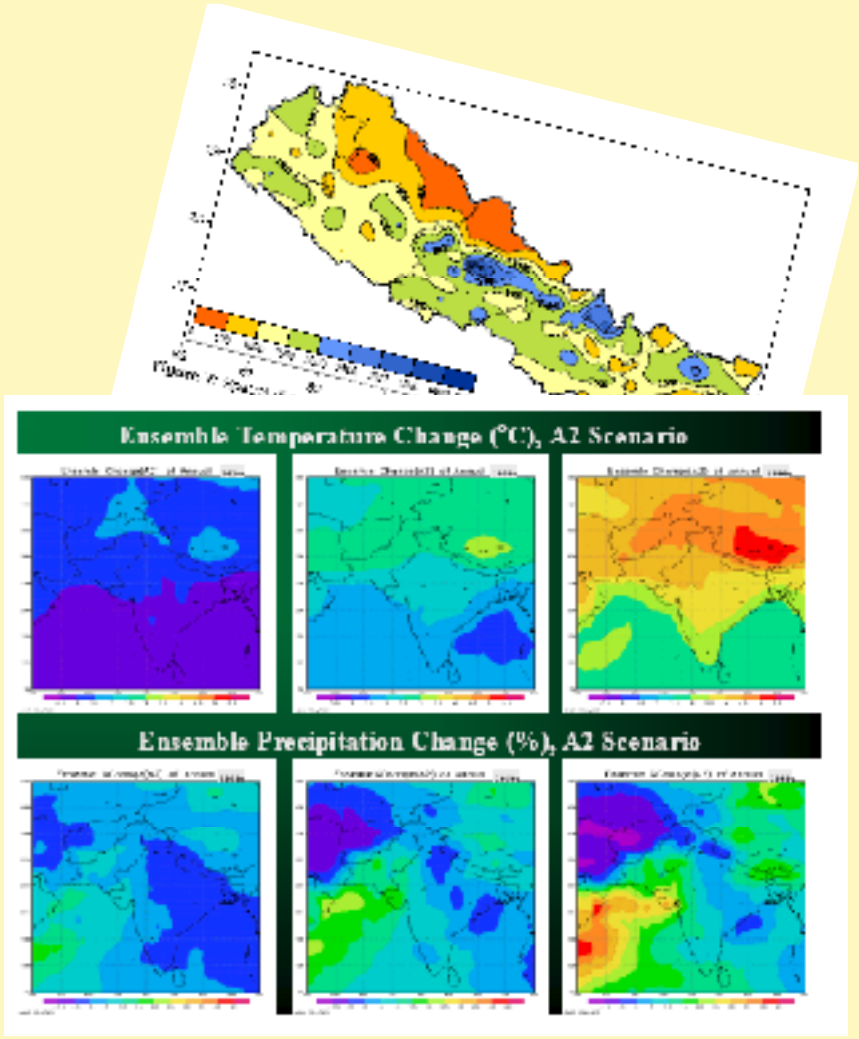
- RegCM3; PRECIS; MM5 and WRF

ii. Watershed Simulation Models (WSMs):

- DHSVM; UBC; HEC-HMS; BTOPMC; HFAM; WatBal;

iii. Cropshed Simulation Models (CSMs):

- DSSAT which comprises the following component models: CERES CROPGRO CROPSIM



Modelling on Impacts on Food & Water Resources

Dr. A.M. Khan

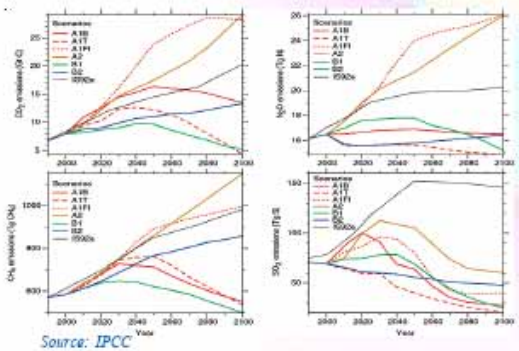
Enhancement of National Capacities in the Application of Simulation Models for the Assessment of Climate Change and its Impacts on Water Resources and Food and Agricultural Production

- Global Change Impact Studies Centre (GCISC), Islamabad, Pakistan

"This project created some good science and this in itself is of importance."

Key Components:

- Underpinning scientific research
  - ***Regional climate change*** in manifestations of temperature & precipitation changes, monsoon variability, floods, droughts and other extreme events; water and food security and melting of glaciers
- Training in regional climate modelling using
  - ***Regional Climate Models***: RegCM3 (Italy); PRECIS (UK); MM5 (USA); WRF (USA)
  - ***Watershed Simulation Models***: DHSVM (USA); UBC (Canada); HEC-HMS (USA); BTOPMC (Japan); HFAM (USA); WatBal (D.N. Yates)
  - ***Crop Simulation Models***: DSSAT (USA) – comprising components: CERES; CROPGRO; CROPSIM
- Engaging in dialogue with and disseminating information to national planners and policy-makers

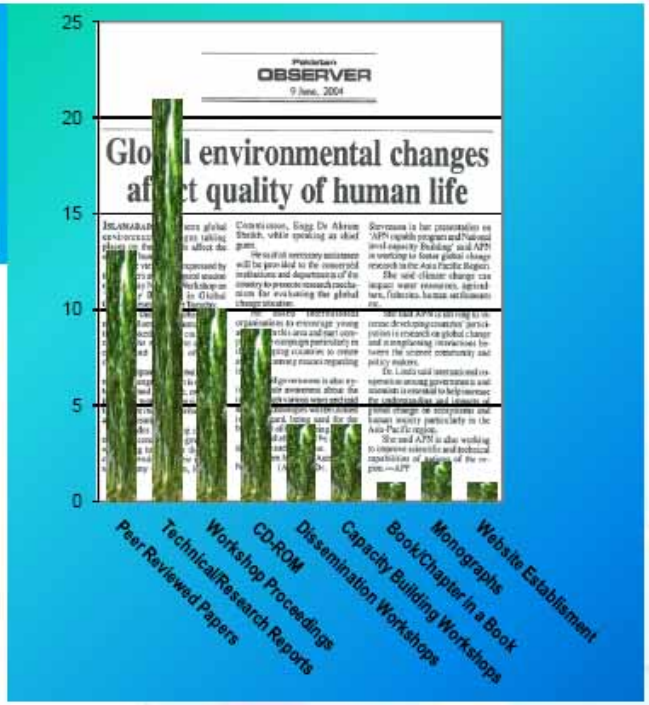


Source: IPCC

David Walland, Australia Bureau of Meteorology and Australia SPG Member said *"Projects like this that builds capacity both in developing regional scenarios, but also takes the outputs and analyses the impacts in various key sectors, are very important."*

Key Outcomes:

- Climate change trends in Nepal and Pakistan over the last 3 to 5 decades derived from available meteorological data
- Projections to 2100 for climatological change in Bangladesh, Nepal and Pakistan based on coarse resolution (about 300km X 300km) of 17 GCMs corresponding to IPCC scenarios A2 & A1B
- Dynamic downscaling for IPCC scenario A2 providing high resolution (50km X 50km) scenarios for South Asia
- Impact assessment of projected climate change on crop yields in different agro-climatic zones of Nepal and Pakistan
- Preliminary results from impact assessment on annual and seasonal flows of main rivers in Nepal and Pakistan
- Preliminary findings from work on adaptation measures and coping mechanisms to counter negative impacts in water and agriculture sectors

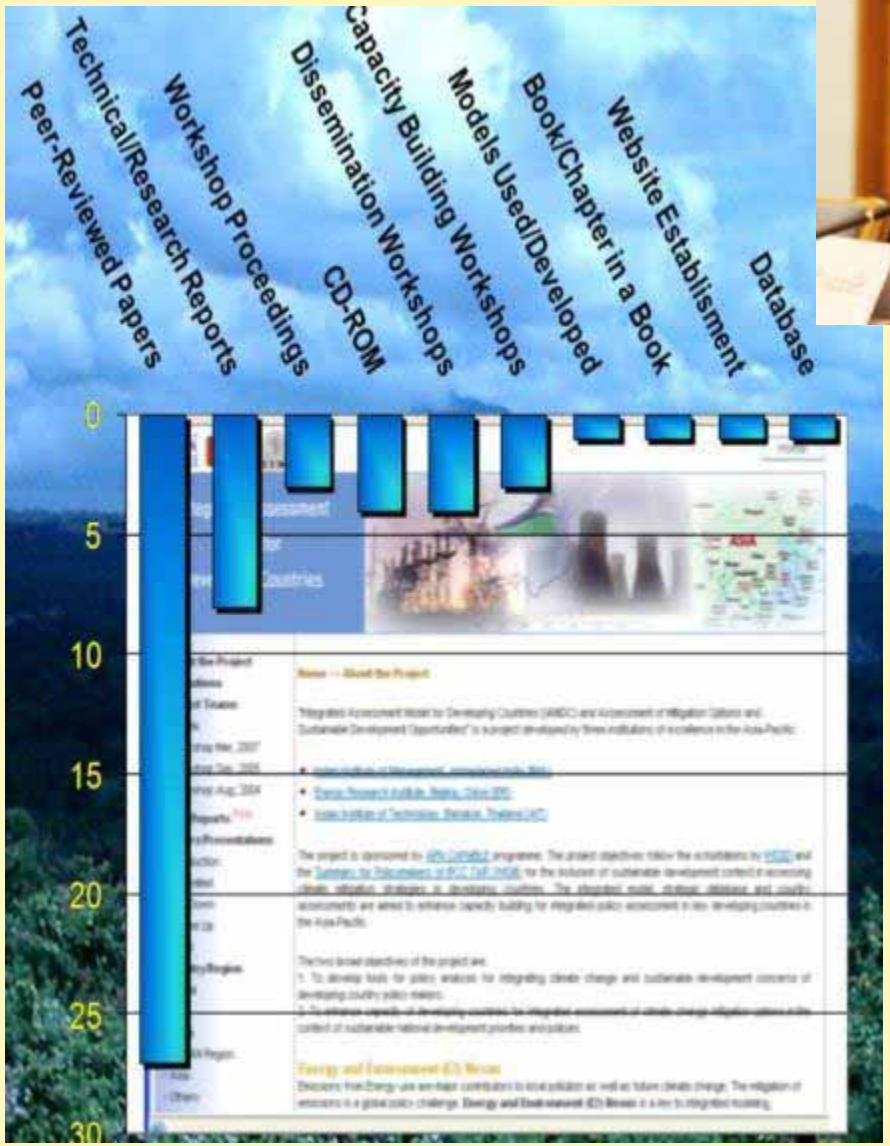


Key Impacts:

- Attitudes toward climate change and related issues are changing within governments
- Policy-makers are more attune to climate change issues and are seeking further information on impacts and vulnerabilities
- The project has sown seeds for other regional projects, including projects with CGIAR and GECAFS and four APN projects

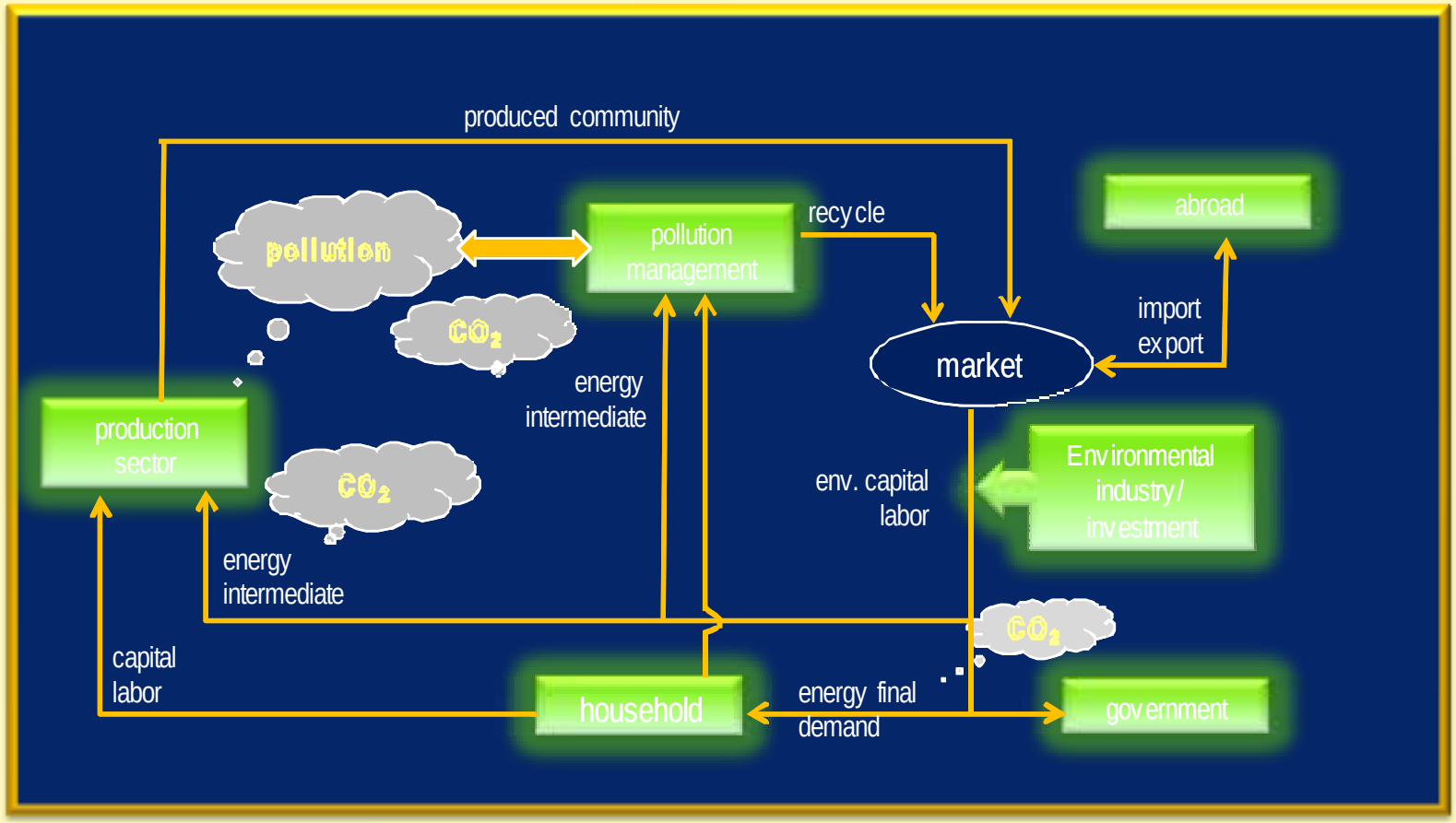
www.gcisc.org.pk

IAM Model Development & Mitigation



Developed a new framework for policy modelling and analysis to align sustainable development & climate change for climate change action plans

CAPaBLE CGE Model Development

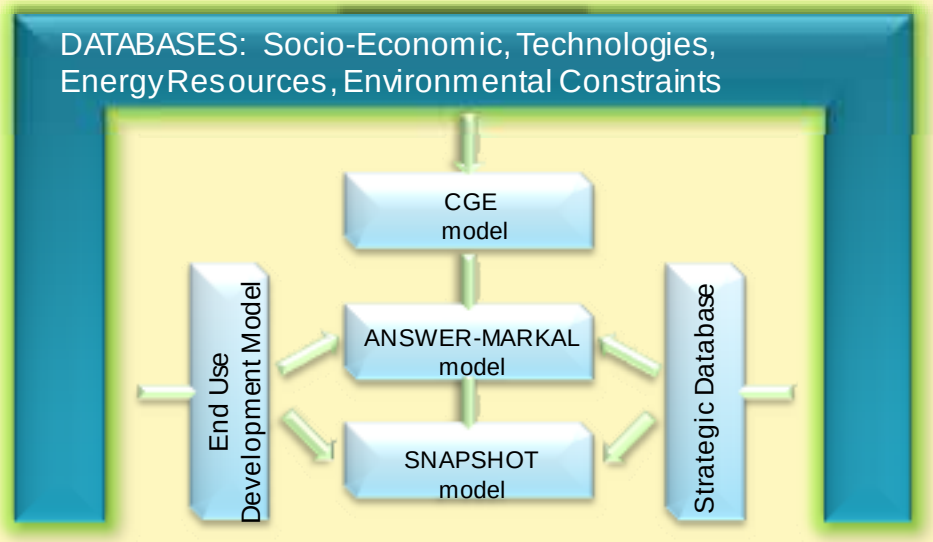


Energy and Environment (E2) Nexus Emissions from Energy use are major contributors to local pollution as well as future climate change. The mitigation of emissions is a global policy challenge.

(E2) Nexus is a key to integrated modeling, especially due to their vital link with development processes in Developing countries. The E2 Nexus is central to the Integrated Assessment of Global Change and Sustainable Development.

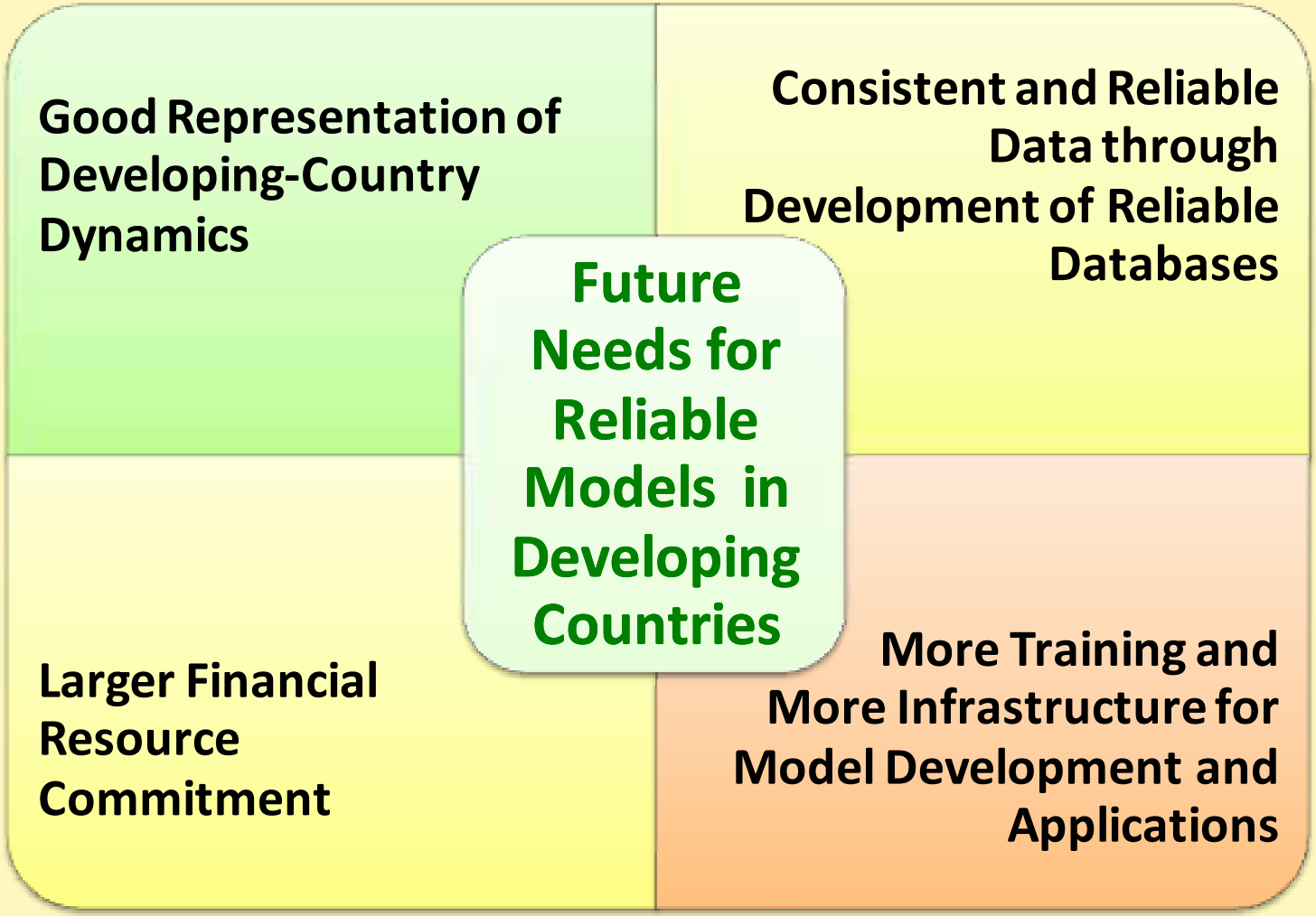
Integrated Modelling Frameworks

- Integrated Modelling Frameworks need to be robust and, at the same time, convey in simple terms the impacts of alternative policies to the policy makers.
- Future models might combine CGE models with ANSWER-MARKAL and SNAPSHOT models



Soft-Linked Model Framework

Integrated Modelling Frameworks



Integrated Modelling Frameworks

Integrated Assessment Model (IAM) for Developing Countries and Analysis of Mitigation Options and Sustainable Development Opportunities
– *Indian Institute of Management, India*

www.c-models.com

Key Outcomes:

- CAPoSLE CGE IAM - model for analysing climate change policies in developing countries
- Model code and software, national scenarios framework and inventory of knowledge resources
- Comprehensive web based interactive tool with soft research infrastructure for stakeholder-scientist interaction
- Existing networks including the newly established regional Asian Energy and Environment Modelling Forum (AEEMF)
- Extensive publications including key citations in IPCC AR4
- Dissemination at policy fora including UNFCCC COP/MOP, UNGSS, FCO Asia

Key Impacts:

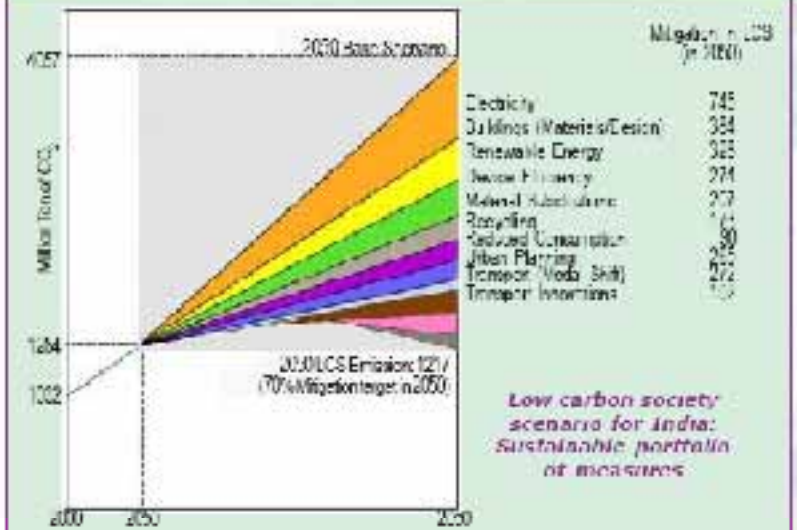
- Close interface with policy-makers for receiving inputs to prepare national scenarios and to communicate results
- Scenarios and quantitative results used as benchmarks by stakeholders
- Contributed to prominent global research projects and initiatives including UNEP's GEO4, IPCC AR4, IEA's World Energy Outlook (WEO), IPCC's new scenarios initiative, the UNEP RISO National Development and Climate project
- Partner scientists are contributing to scenarios development for the 5th IPCC Assessment Report

Prof. P.R. Shukla

Key Components:

- Generating national GHG mitigation scenarios recognising explicit developing country dynamics
- Collaborating regionally to initiate national modelling exercises and develop national databases
- Generating knowledge to inform climate policy and develop GHG mitigation policies

Dr. Tara M. Inman, National Programme Leader, US Department of Agriculture and U.S. Member for EPA said *"The outputs and impacts of this project are the result of good planning and effective communication."*



Low carbon society scenario for India: Sustainable portfolio of measures

IPCC TAR 2001

↓

WG III

Integrated Assessment Model for Developing Countries and Analysis of Mitigation Options and Sustainable Development Opportunities

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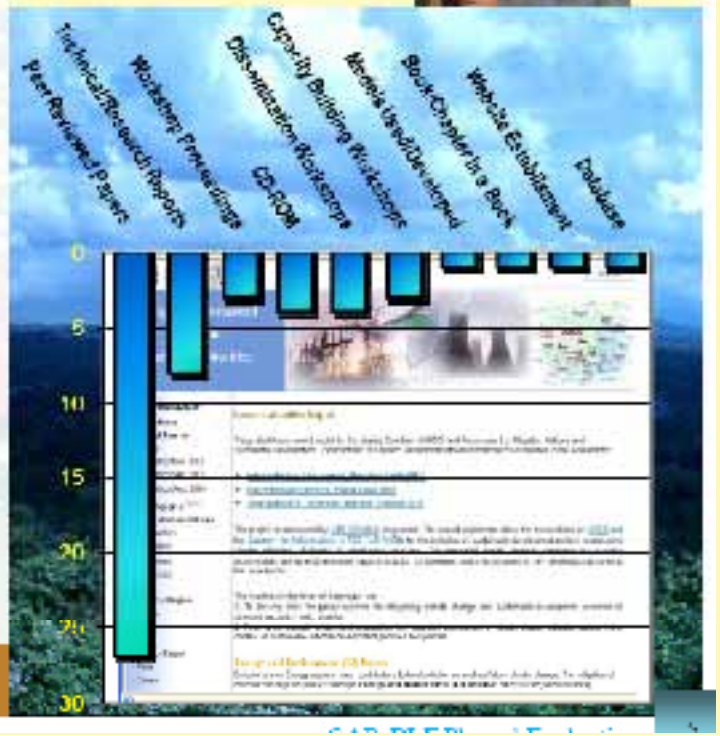
IPCC AR4 2007

The research tool were taken from the recommendations outlined in the IPCC TAR, specifically the recommendations from Working Group III on climate change mitigation.

Results from the project are cited in IPCC AR4



"A new framework for policy modelling and analysis to align sustainable development and climate change policy has been established and this has input to national climate change action plans."

Regional Trends in Climate Extremes

POSSIBLE THROUGH THE USE OF GIS & COMPUTER MODELS

OBJECTIVES:

- **Develop and compute indicators of trends in climate extremes for the Asia-Pacific region**
- **Build regional capacity in systematic handling and analyzing of climate data**
- **Promote the application of climate trend indicators for government policy development**

By obtaining the indices and indicators of climate extremes, we can provide useful information and support the government taskforces in establishing countermeasures for the Climate Change Convention.

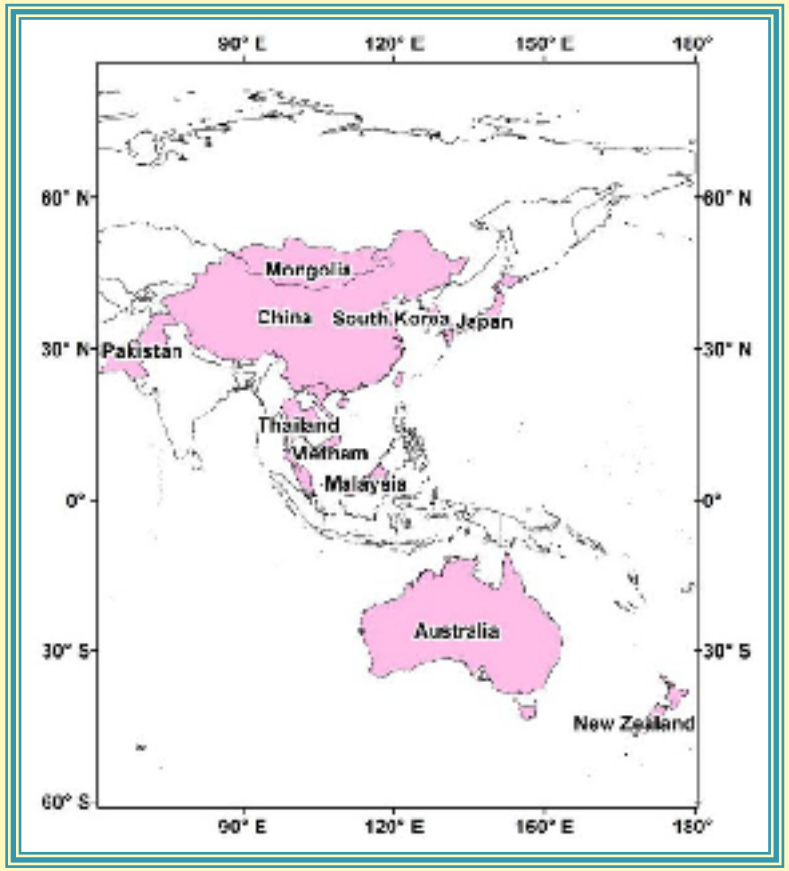
Regional Trends in Climate Extremes

- 31 extreme climate indices extracted from daily maximum and minimum temperatures as well as daily precipitation observed at more than **100 weather stations across ten APN countries** (including Australia, China, Japan, Malaysia, Mongolia, New Zealand, Pakistan, Republic of Korea, Thailand, and Vietnam).

- Linear trends and their significance in the time series of extreme climate indices are calculated using ***RClimDex*** (Zhang and Yang, 2004) and mapped using ***Geographic Information System (GIS).***

- Collaborated results indicate that the number of warm days/nights (upper 90th percentile of Tmax and Tmin) in summer has increased across the study region, while the number and duration of cool (lower 10th percentile of Tmax and Tmin) days/nights or coldness-related indices in winter have decreased.

RESULTS



Regional Trends in Climate Extremes

- Digitised daily climate data in participating countries; and homogeneity and quality control of generated data was established using appropriate software.

- Enabled the transfer of technological know-how and techniques for generating and analyzing climate extreme indices and, at the same time, aided many countries in the region to apply this digitizing technology.

ICT Capacity for Climate Change – Google is increasingly used as a tool in climate-related activities

Figura 2: Laichau station (48800) geographical position. Photo copyright by Google Earth.

Training in Model Downscaling

The main results from the APN-funded APCC Training Course could be combined into three groups:

1. Theoretical knowledge in *downscaling theory and techniques and in multi-model combination*.

2. Practical experience in *access to and processing of the APCC basic data – global model outputs*.

3. Practical experience in the *usage of the APCC CLIK for the purposes of downscaling.*

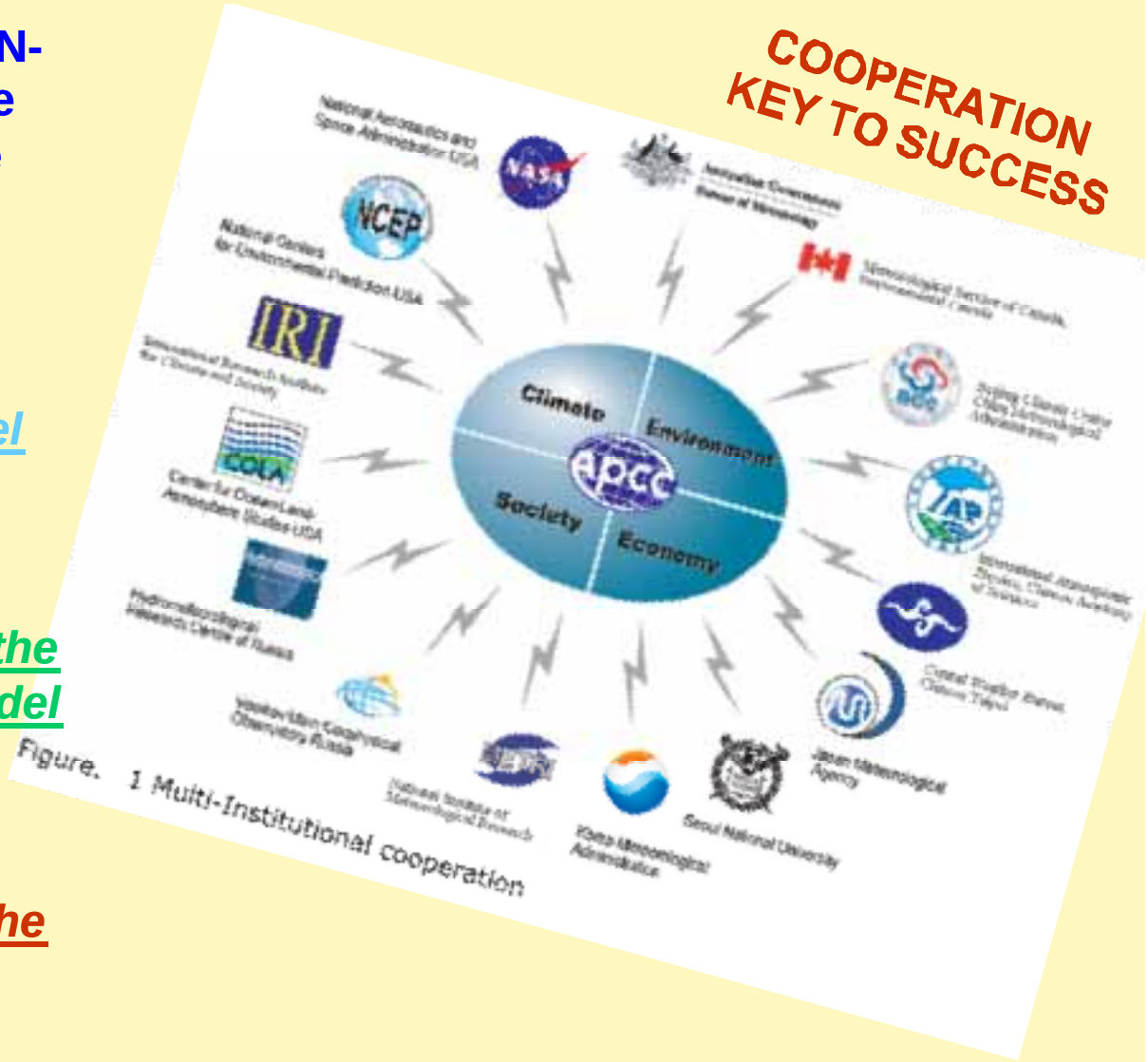


Figure. 1 Multi-Institutional cooperation

ICT and Global Earth Observations

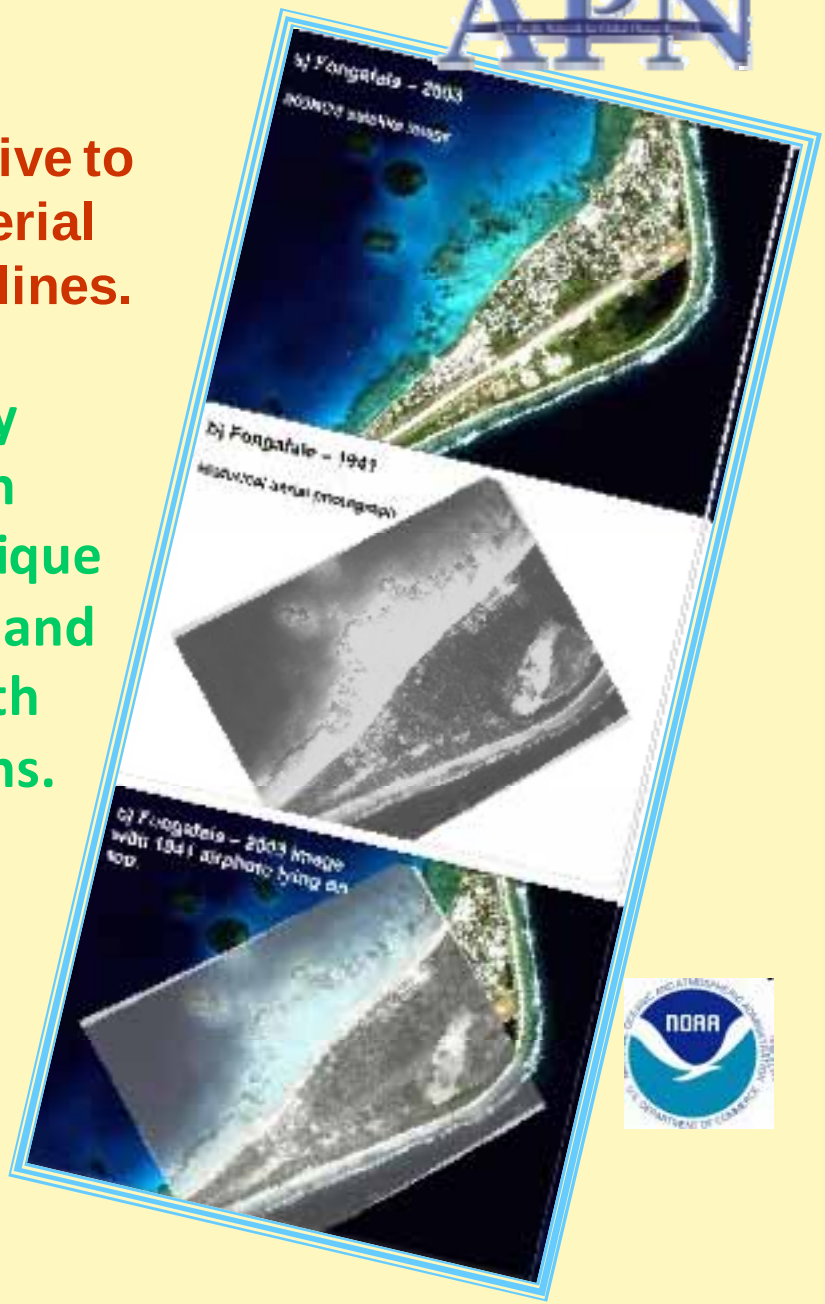
ICT – Massive developments in ICT for earth observations – but more needs to be done - particularly in digitising & archiving historical data in the developing nations of the Asia-Pacific Region

APN & PI-GOOS

PI-GOOS has embarked on an initiative to develop a catalogue of historical aerial photographic of Pacific island coastlines.

Analysing modern day satellite imagery alongside historical aerial photos taken during the last 50-60 years can provide unique insights into the ways in which shorelines and coastal environments have evolved, both naturally and through human interactions.

The picture to the right show an aerial photo from 1941 of Fongafale islet, the main population centre in Tuvalu, overlaid on top of a satellite image from 2003.



Asian Water Cycle Initiative (AWCI)

Development/adaptation of effective tools for enhanced data collecting and data management including: ***software for data processing, quality control and format conversion, sophisticated database systems, and other tools***

Development/adaptation of advanced technologies for data integration and data dissemination to research groups including: ***data integration systems based on Internet technologies and capable of integrating data from various sources such as satellite, in-situ, and model output data, metadata schemes following ISO standards, etc.***

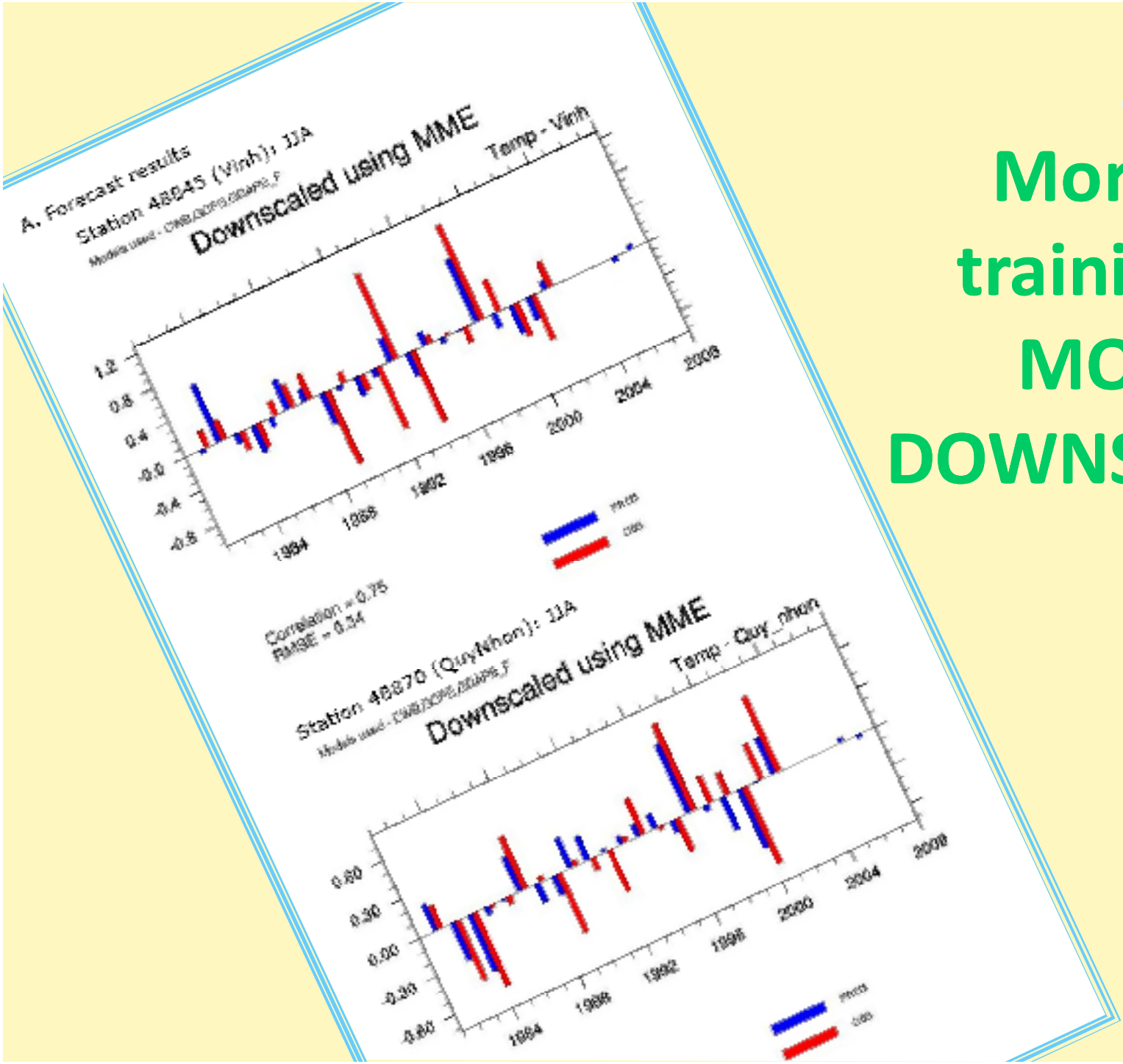
Cooperating with GEOSS and the APN

More Needs to be Done

Problematic situations related to global earth observations and climate change research in developing nations of the Asia-Pacific:

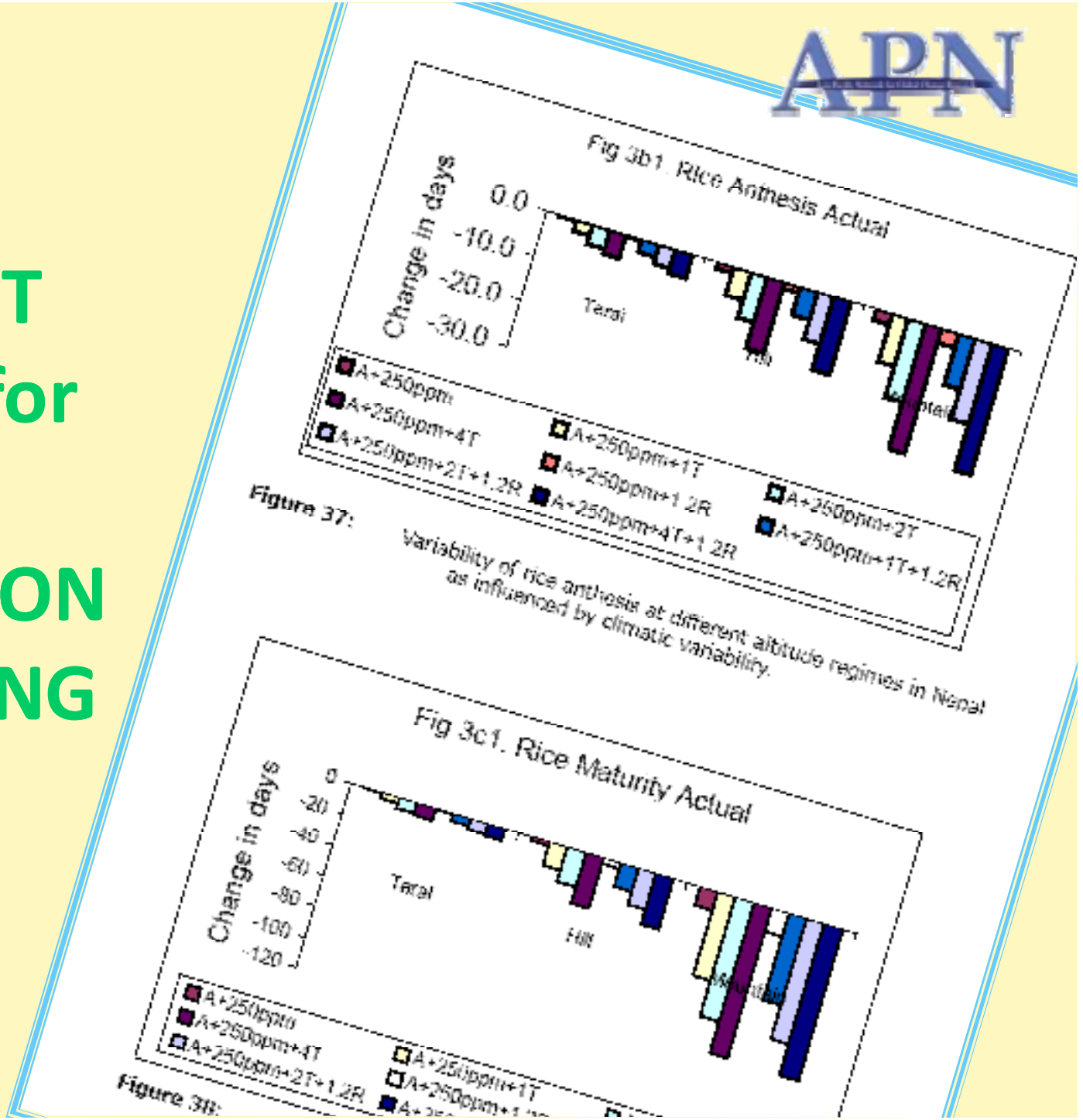
- Still considerable ***lack of observational data*** (meteorological, oceanographic, socio-economic, etc.);
- ***Lack of accessibility to existing data*** for researchers of the region;
- Scarcity of experienced scientists, ***lack of infrastructure***; and
- ***Lack of familiarity*** with relevant methods and models; and
- ***Limited archived data and analytical interpretation***

Sectors identified as most vulnerable: Food and fibre; Biodiversity; Water resources; Coastal ecosystems; Human health and settlements; and land degradation.



More ICT training for MODEL DOWNSCALING

More ICT training for CROP SIMULATION MODELLING



Some Risks and an APN Response

Sectors at Risk

Agriculture, Water (floods, drought, security), Forests,
Coastal zones, Mangroves, Maritime resources

mainstreaming adaptation strategies most challenging

APN's Response

Scientific Capacity Building for Impact and Vulnerability Assessments

Capacity in ICT for Climate Research

Areas where APN can assist and collaborate

- Funding support for research and capacity building activities through the annual calls for proposals
- Establishing channel/mechanism for sharing research results/accessing data, etc.
- Training activities and technology transfer in the region in cooperation with other institutions
- Encouraging involvement of scientists, end-users, decision-makers in the region in research and CB activities
- Facilitating science-policy linkages
- Linking with partner research programmes and facilitating regional collaboration.

Best Practices in Governments

Science-Policy

- Informed decision-making based on international assessment, convention reports
- Established climate change research centres
- Established centres, task forces, units within governments, with a mix of scientists, planners and decision-makers
- Promoting initiatives at the national/local level: low carbon society, use of biofuel, energy efficiency and green technology
- Engaging the public/science/policy communities in dialogue for sharing information and raising awareness

Obstacles still exist, but are actively being challenged

Key to Success

Continued success through

- Continuous dialogue
- Strengthened partnerships
- Among all stakeholders
- At all Levels

APN

NCAR NIWA SPREP PICES UNFCCC UNU-INWEH

START
IHDP • IGBP • WCRP

Department of Meteorology Sri Lanka CLIVAR ERI APSRU GLOBEC

GLOBAL CHANGE
IGBP

WCRP

IAI INTER-AMERICAN INSTITUTE FOR GLOBAL CHANGE RESEARCH

DIVERSITAS
an international programme of biodiversity science

GEO GROUP ON EARTH OBSERVATIONS

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