UNU and UNCECAR

Srikantha Herath

Institute for Sustainability and Peace

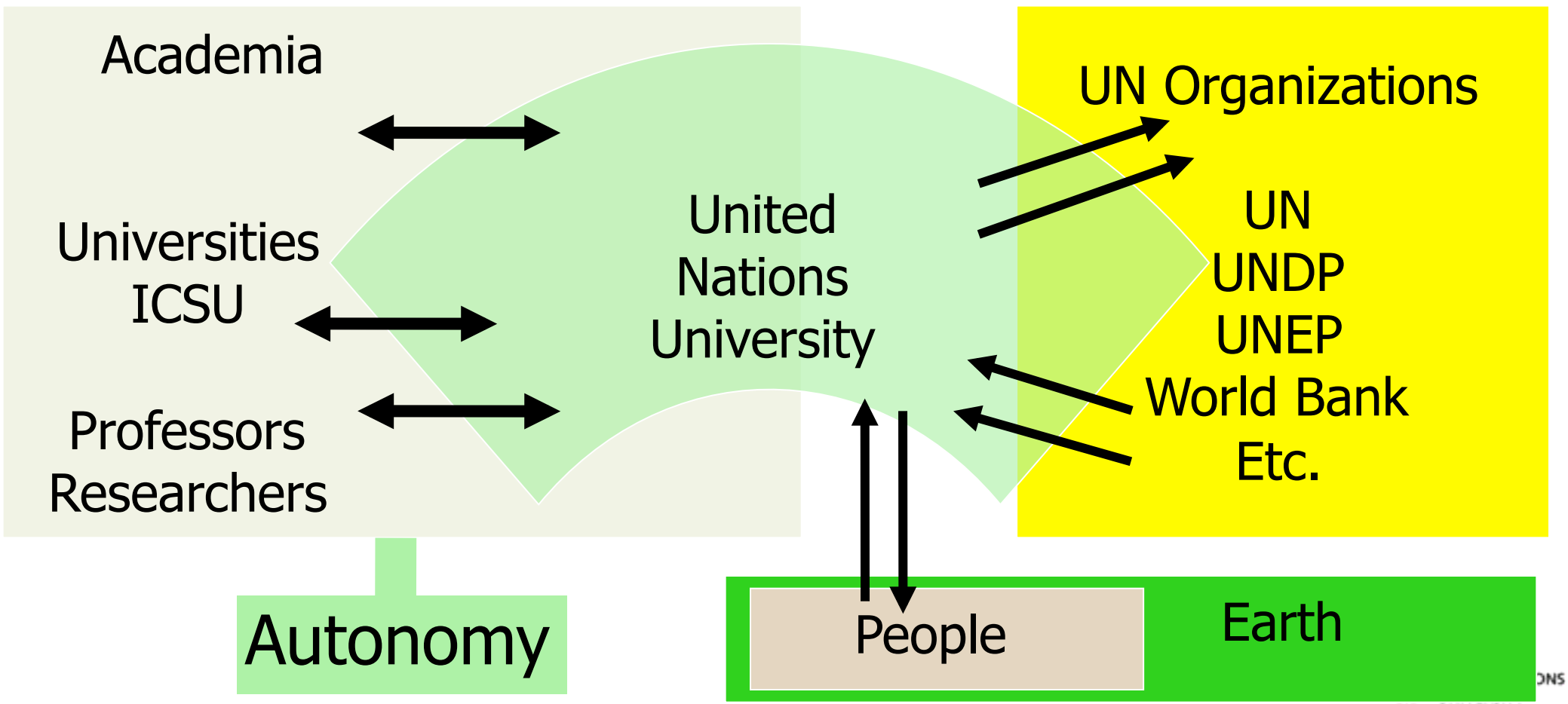
United nations University

20th August, 2012

UNITED NATIONS UNIVERSITY
UNU-ISP

- An autonomous organ of the United Nations, International community of scholars engaged in research, postgraduate training and the dissemination of knowledge

The UNU was established by the General Assembly on 6 December 1973. The UNU started its activities in 1975 at its headquarters in Tokyo.



UNITED NATIONS UNIVERSITY

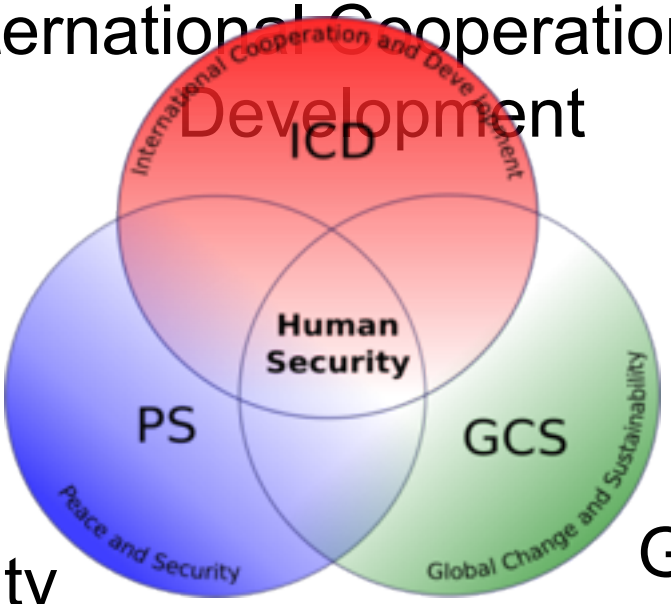
UNU WORLDWIDE

- **15 UNU Centers** ---world wide (ISP, EHS, WIDER, INWEH,etc.,)
- **22 Associated Institutions** (AIT, ITC, *GFMC* etc.,)
- Cooperating Institutions
- **International Operating units**
- Joint research projects with a **network of faculty**
- **Financed** by voluntary contributions - host countries and research grants

UNU-ISP Mandate

To take a holistic approach to problem solving by integrating knowledge and methods from different disciplines; based on Sustainability Science

International Cooperation and Development



Peace and Security

Global Change and Sustainability

Takes an innovative approach to sustainability, aiming to transcend traditional divides between the humanities, natural and social sciences.

Research to Implementation: Capacity Development needs

- Enabling flow from research to implementation in developing countries
- Involvement of a range of disciplines
- Target groups:
  - Higher education: Customizing global knowledge (M.Sc. from 2010, Ph.D. from 2012)
  - Professionals: Rapidly train a large number
  - Policy makers: Key messages

Need to integrate Research, Capacity Development and Applications for adaptation and mitigation

- Capacity development programs for training a large number of competent persons.
- Implement community based development projects
- Higher Education Research on CCA & Mitigation

National training programs for researchers and practitioners

Supporting Post graduate Research

Demonstration Project Community interaction

Training of trainers

Dissemination of results to policy makers

Capacity Development for Climate Change

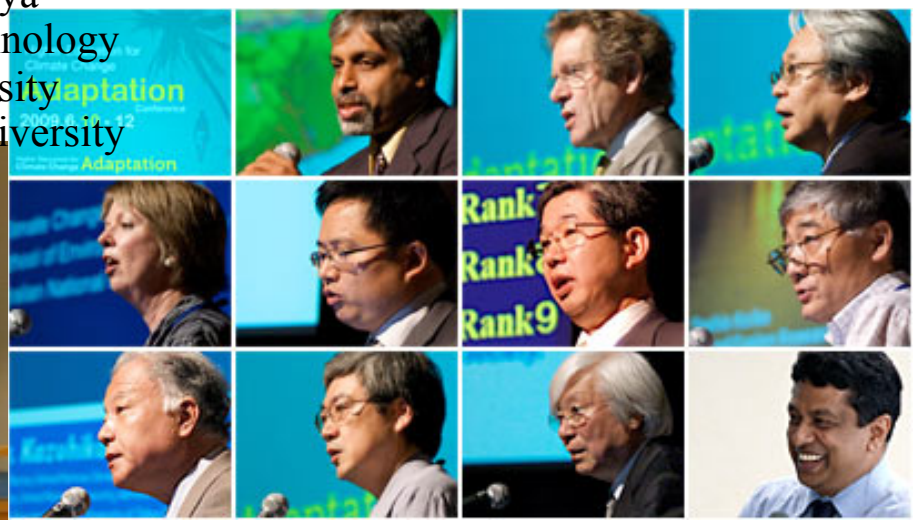
- Requires a range of inter-connected tasks
  - Selecting climate projections, downscaling these projections to local conditions, correcting them, analyzing resulting weather, then to estimate impacts on a given sector when the weather change, design adaptation plans to reduce adverse impacts and prioritizing based on economic considerations or risk management perspectives.
  - Existing methodologies for some, others new (red).
  - Address uncertainty, need to update .
  - Need research or studies to translate to local scale (underlined)

Role of Higher Education in Adapting to Climate Change 2009 June

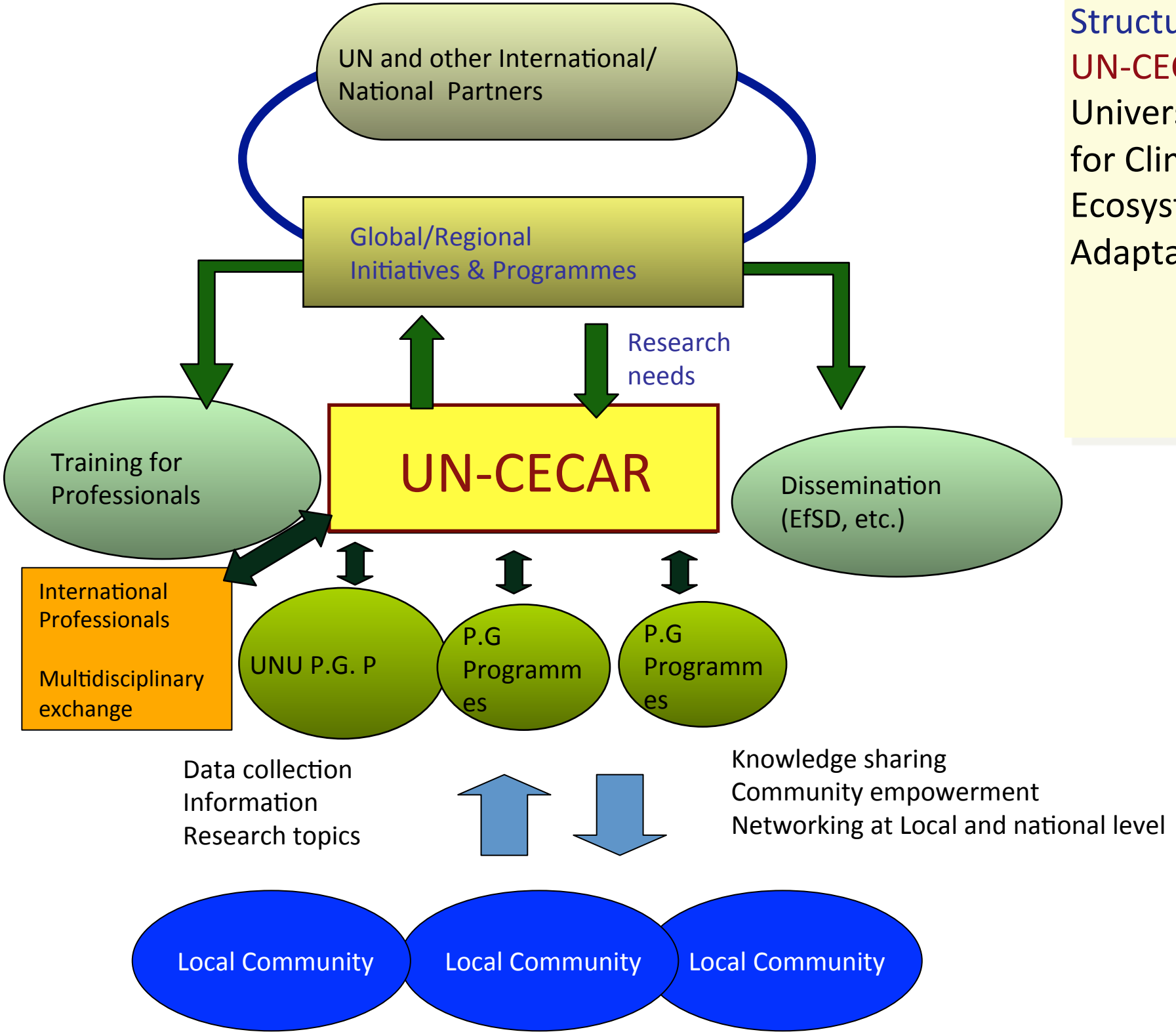
- Multidisciplinary approach
- Holistic View, Towards Sustainability
- Share resources → NETWORK UNCECAR

Australian National University
Bangladesh University of Engineering and Technology
Tsinghua University
Chinese Academy of Forestry
Indian Institute of Technology Delhi
Indian Institute of Technology Kharagpur
Gadjah Mada University (UGM)
Keio University
Kyoto University
The University of Tokyo
Ibaraki University
Waseda University
Ritsumeikan Asia Pacific University

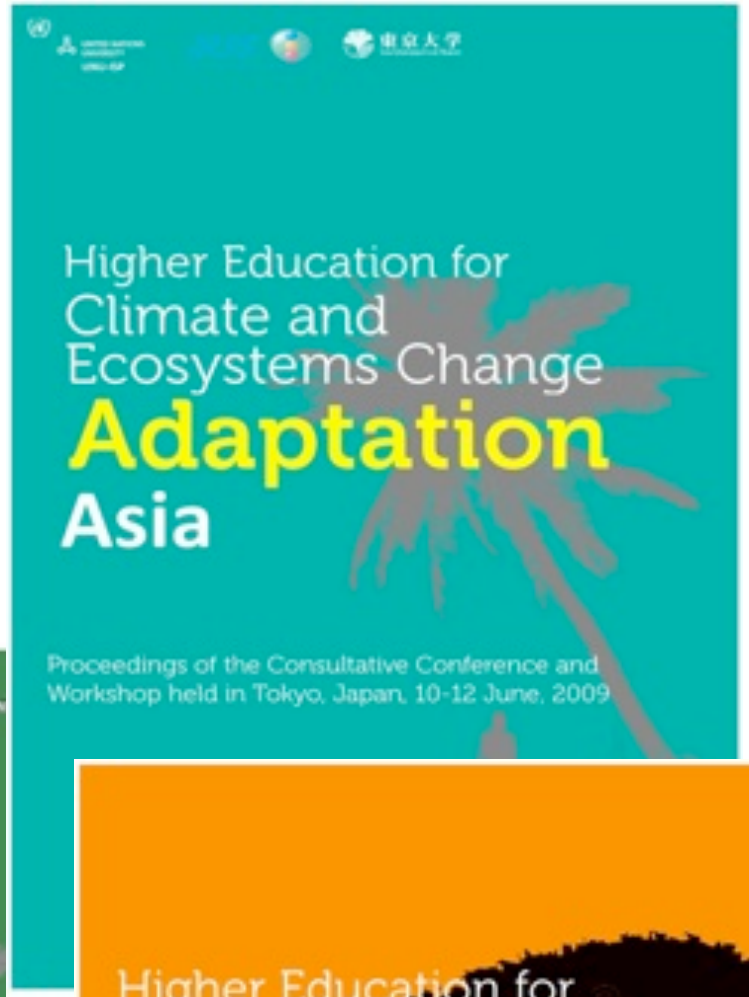
- Integrated Research System for Sustainability Science
- National University of Malaysia (UKM)
- Tribhuvan University
- University of Engineering and Technology Lahore (UET)
- University of the Philippines
- Yeungnam University
- Seoul National University
- Nanyang Technological University
- University of Peradeniya
- Asian Institute of Technology
- Chulalongkorn University
- Viet Nam National University

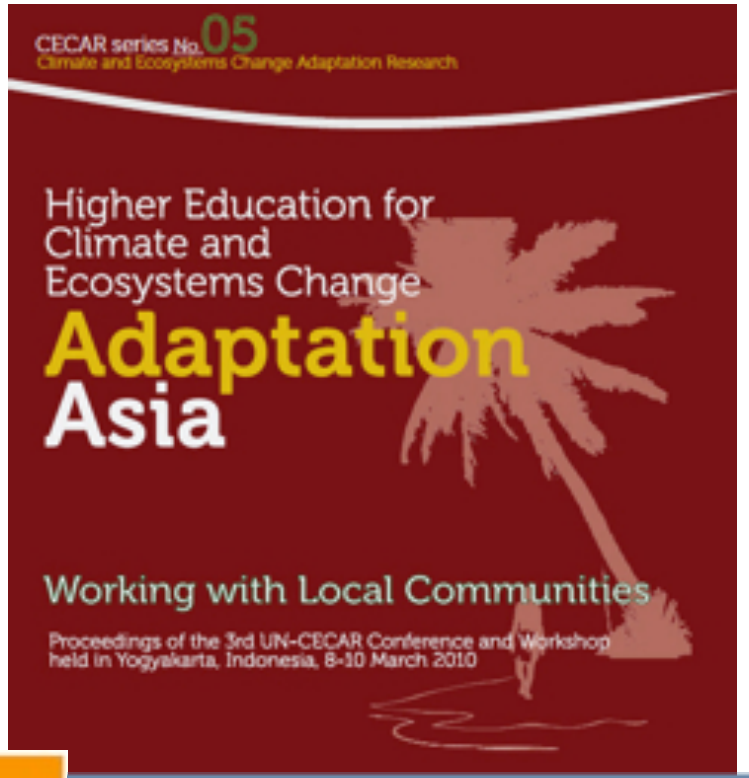


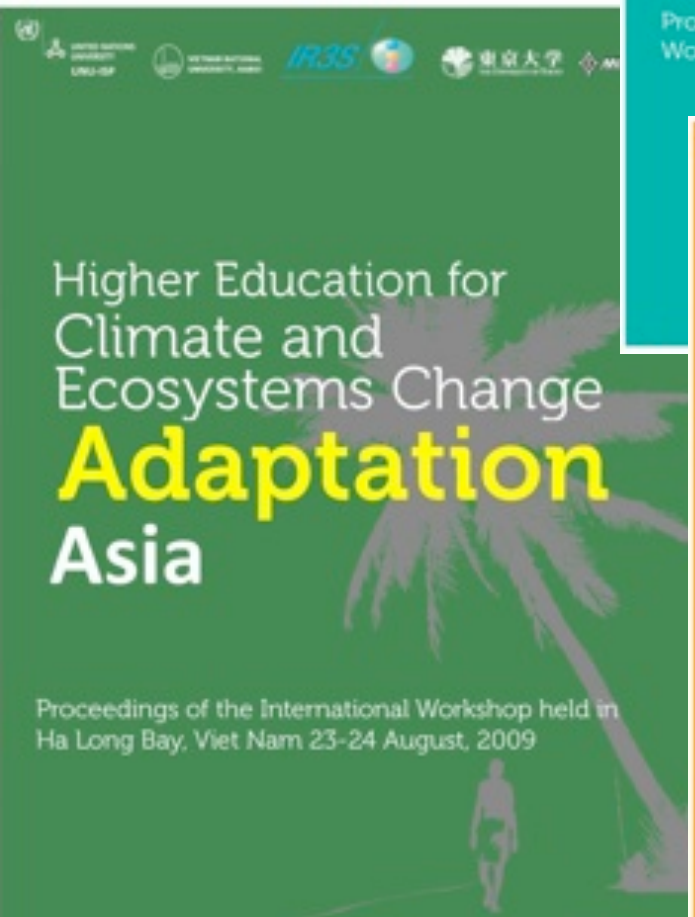
Structure of UN-CECAR University Network for Climate and Ecosystems Adaptation Research

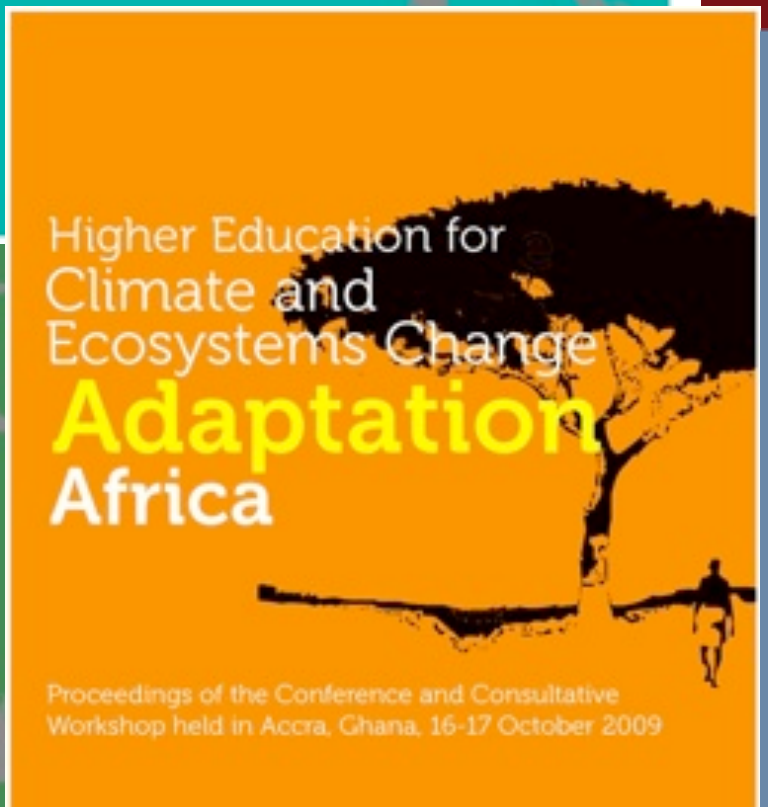


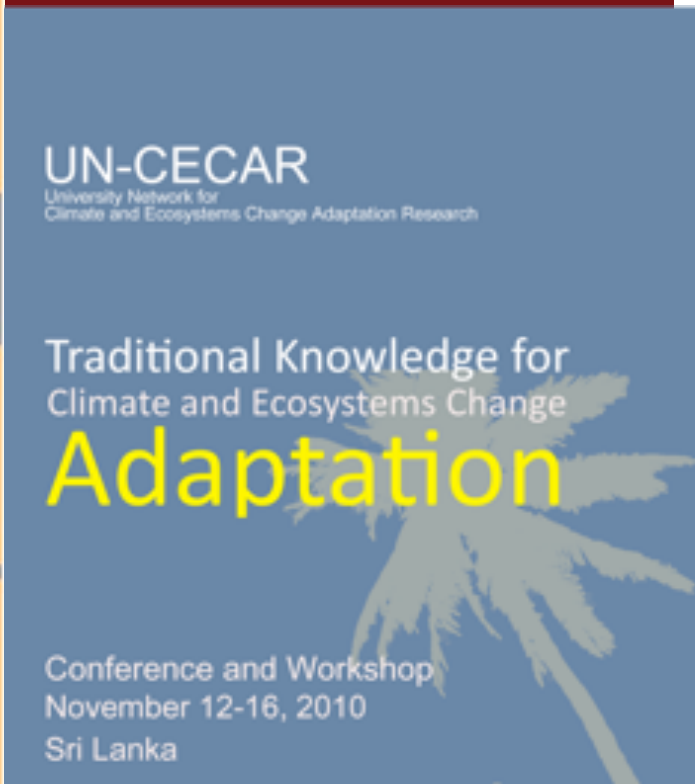
Conference Proceedings





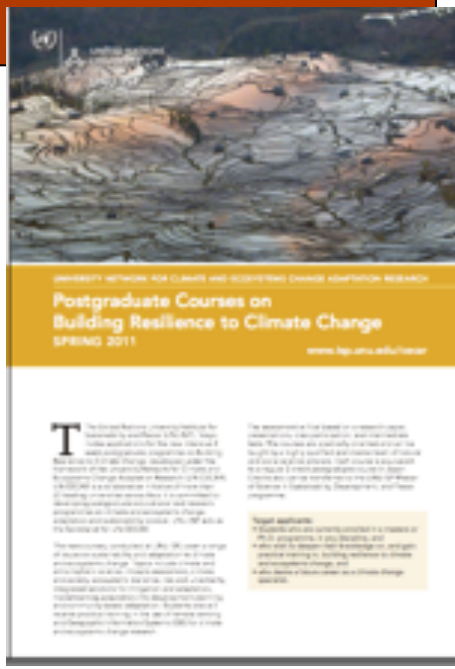




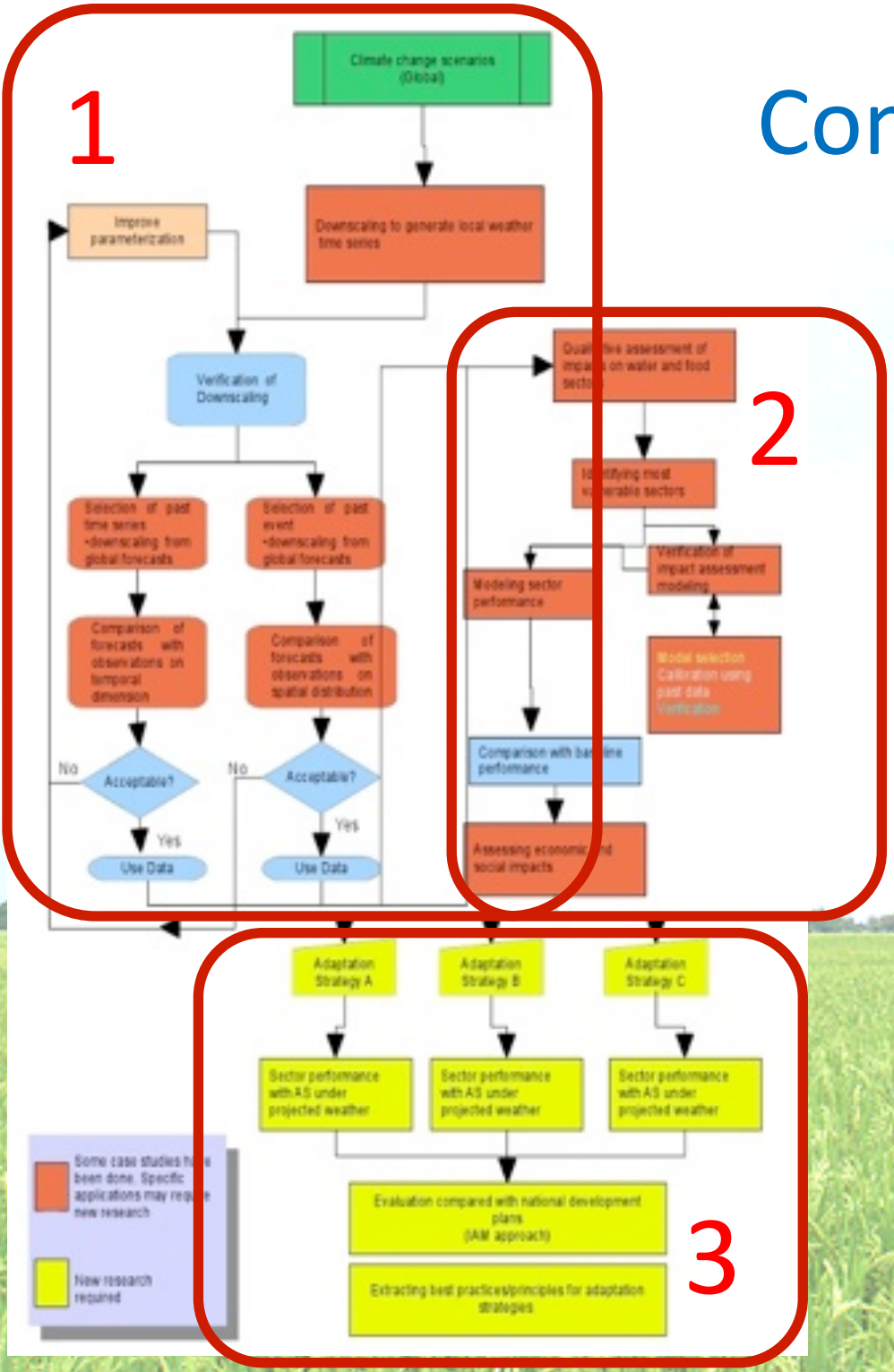


Actions

- Joint actions by UN-CECAR
  - Joint Research Project Development (2 themes)
    - Rapid Onset Changes; Floods, Cyclones
    - Slow Onset Changes; Land degradation, Bio-diversity loss
  - Curriculum Development
    - BUILDING RESILIENCE TO CLIMATE CHANGE
      - Science of Climate and Ecosystems Change; Adaptation and Mitigation; Impacts and Vulnerabilities
    - RENEWABLE ENERGY
      - Technology and Policy
  - Needs Assessment (4 countries)
  - Training Programs :
    Downscaling: Approaches and Applications



Conceptual Framework



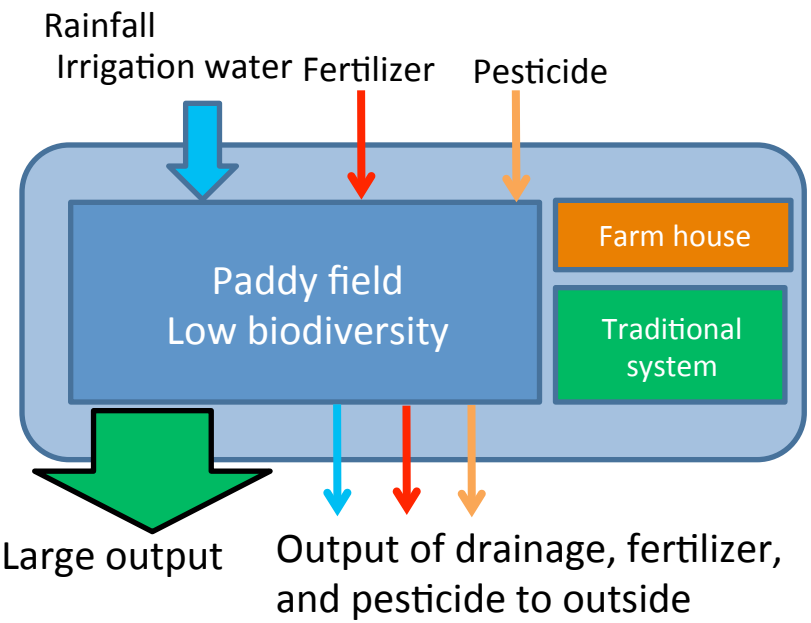
- Downscaling to generate local weather time series
  - SDSM, WRF
- Simulation of impacts on water and food sector though case studies
  - DSSAT(rice), FMS..
- Adaptation strategies
  - Assessment of APs

Source: UNU CSDS-IACC Project Website

Bio-production system in harmony with conservation of biodiversity

Modern crop production system

Large input from outside of the system

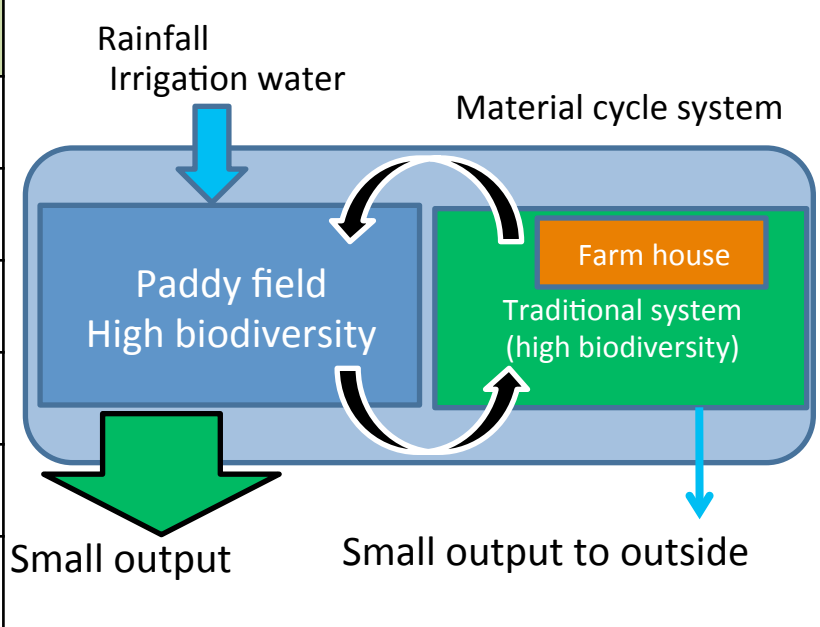


Ecosystem services inventory

Ecosystem service	Index	Flow/ Stock
Provision service	Rice	···
	Orchards	···
	Fishes	···
Adjust service	Water purification	···
Basement service	Material cycle	···
Bio-diversity service	Crops, Orchards, Birds, Fishes, Plants, ……etc	···

Traditional crop production system

Small input from outside of the system



Work together with sub theme 1

Development of technology and social system of low input sustainable production system which prevent catastrophic collapse

Synthesis between modern and traditional crop production systems

Work together with sub theme 2

Presentation of policy options for the use of local resources through strengthening resilience with scientific evidence

Mosaic crop production system with strengthened resilience

Building Resilience to Climate Change 1
Science, impacts and vulnerability

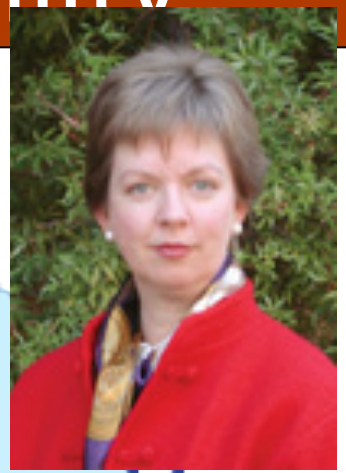
- Taught by partner university faculty and international experts.

Extremes and Impacts on Agriculture, Eco Systems, Water

Climate and Earth System; Climate Change Evidence and Implications

Scenarios, Uncertainty, Downscaling

Complex Systems, Integrated Assessment



Building Resilience to Climate Change 2
Approaches to adaptation









- Students nominated by member uni, credits are transferred.Open to all

National Target Pogramme, Adaptation Framework

Urban and Rural Adaptation Strategies

Community based Development and Response

Sectoral Strategies Energy and Water

Economic Assessment Cost benefit Adaptation Cost

Combined with Applied Training

- Combined with hands on training with Remote Sensing (JAXA) GIS (AIT,Nippon Koei Co. and ESRI) applications for climate change analysis: Water and Food production.
- Special emphasis on Community Based Adaptation Planning and Implementation methods (Gadjah Mada University, Indonesia)

(2012~) Low Carbon Society: RE and Governance
Renewable Energy (RE) I: Science & Technology

Energy and Environment
- World, regional energy resources and demand growth
- Energy use and impact to the environment
- Energy security, sustainability and prices

RE Sources and Conversion Processing
- Hydro, Solar (PV and Thermal), Wind, Geothermal, Bio-energy, Ocean Energy

Measurement and Analysis of Energy Output
- Resources assessment approach
- Conversion factor approach and computational model
- Pricing model and Case Studies

Integrated Market and Utilization
- Energy distribution (for different purpose)
- Grid and Hybrid System Distribution, Energy Storage System
- Market mechanism and economic

Innovation and Development
- Existing technology (case studies of success and failure)
- Future trend technology
- Efficiency improvement

Waste Management
- Life cycle analysis
- Waste generation during processing and after utilization
- Environmental impact of RE

(2012~) Low Carbon Society: RE and Governance
Renewable Energy (RE) II: Policy and Economics

Energy in 21st Century
- Energy Outlook, Worldwide energy consumption and potential
- RE resources potential in Asia
- Introduction of Clean Development Mechanism (CDM)

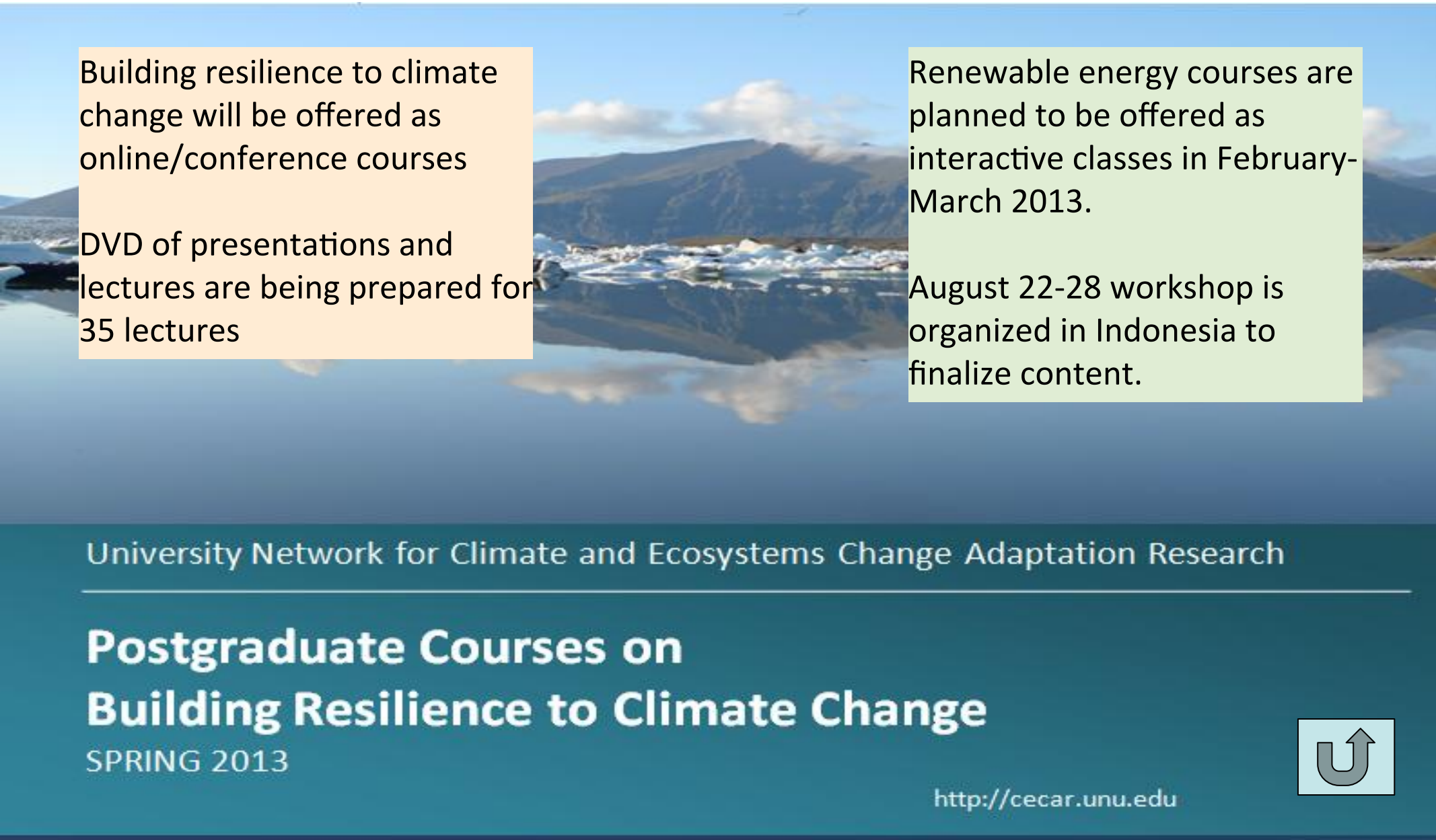
Energy Context and Regulatory Framework
- International Energy Policy and Overview of Energy Policies in Asia
- Institutional Framework- involvement of stakeholders in policy making
- International Environmental Law
- Trans-boundary water rights and property rights

Economics of RE
- Overview of international RE pricing- for all RE resources
- Energy Pricing Mechanisms
- Economic instruments for promotion of RE
- Economic analysis including socio-economics benefits of RE options

Sustainable Development
- Renewable energy in the context of sustainable development
- Rural electrification and community services
- Other socio-economic to rural community

Project Planning and Management
- Project design, Selection of technology and Feasibility study
- Financial analysis and risk assessment
- Environmental impact assessment
- Project development and commissioning

Postgraduate Courses on Building Resilience to Climate Change and Renewable Energy



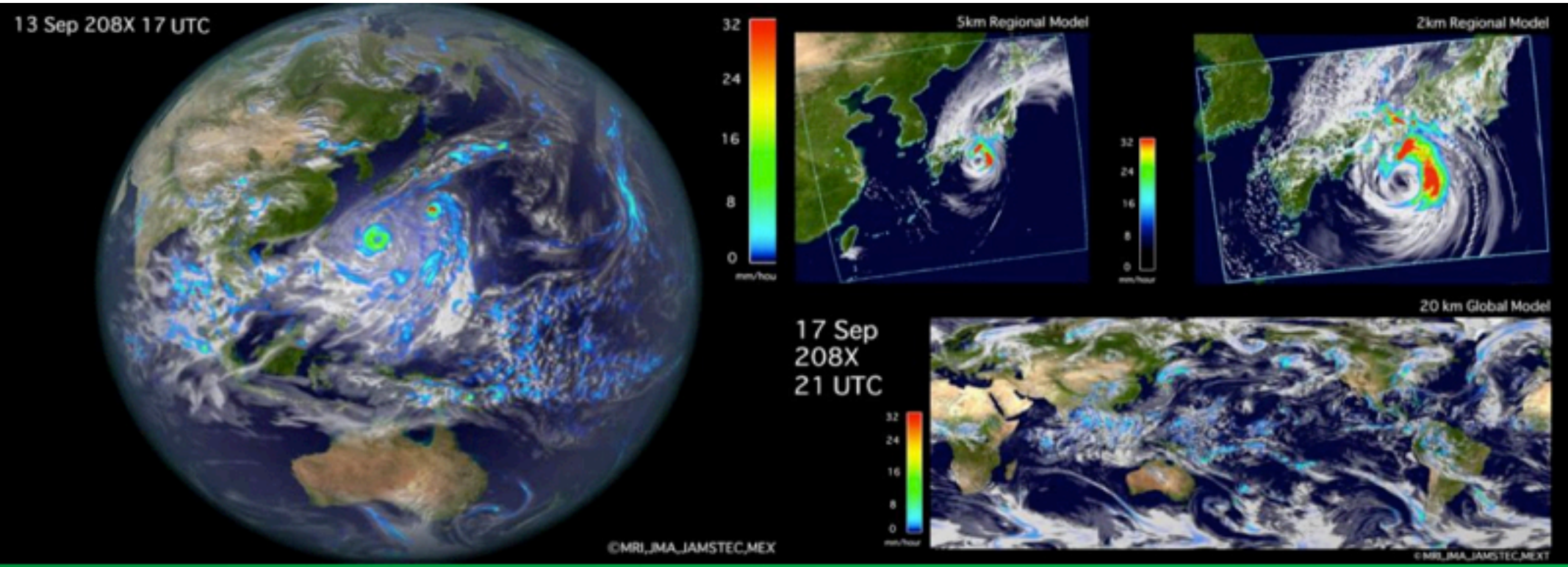
Building resilience to climate change will be offered as online/conference courses

DVD of presentations and lectures are being prepared for 35 lectures

Renewable energy courses are planned to be offered as interactive classes in February-March 2013.

August 22-28 workshop is organized in Indonesia to finalize content.

Training Programme on Climate Change Downscaling Approaches and Applications



University Network for Climate and Ecosystems Change Adaptation Research

Training Programme on Climate Change Downscaling Approaches and Applications

10-22 November 2012

http://cecar.unu.edu

Training Programme on Climate Change Downscaling Approaches and Applications (I & II)

- 10-day Training Programme (5 d/s , 5 applications)
- Target applicants are postgraduates, researchers, professionals from government or national agencies
- Developed with the support of the MOE and IGES
- 1st Training: November 2011 at UNU HQ
- 2nd Training: December 2011 at IMHEN Viet Nam
- Next Training Programme at Bangkok, Thailand in November 2012. Supported by Asia Pacific Network for Global Change Research (APN)



CECAR series No.07
Climate and Ecosystems Change Adaptation Research

Proceedings of International workshops for
Developing a Training Programme on

CLIMATE CHANGE PROJECTIONS DOWNSCALING: *APPROACHES AND APPLICATIONS*

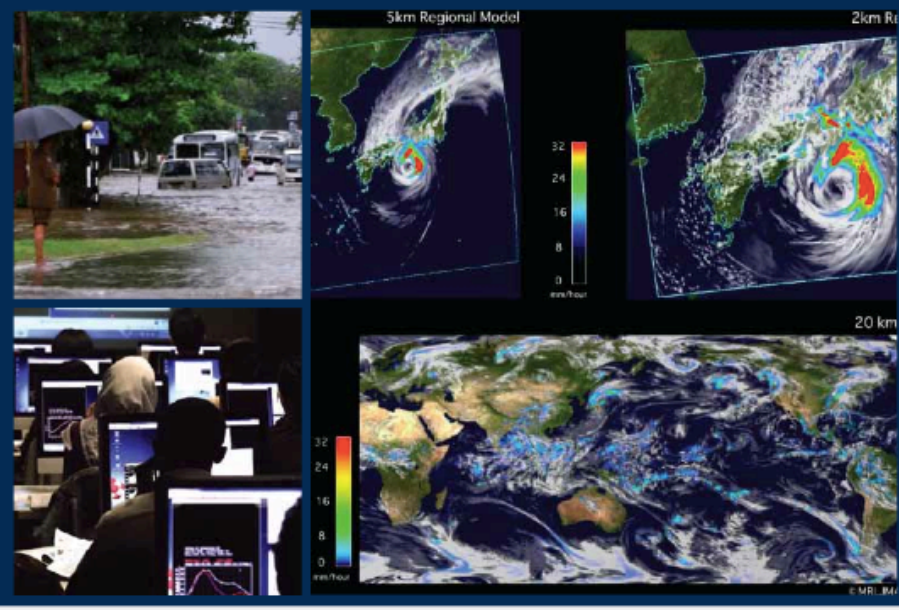
UN-CECAR
University Network for Climate and Ecosystems Change Adaptation Research

UNITED NATIONS UNIVERSITY
UNU-ISP
Institute for Sustainability and Peace

CECAR series No.08
Climate and Ecosystems Change Adaptation Research

DOWNSCALING

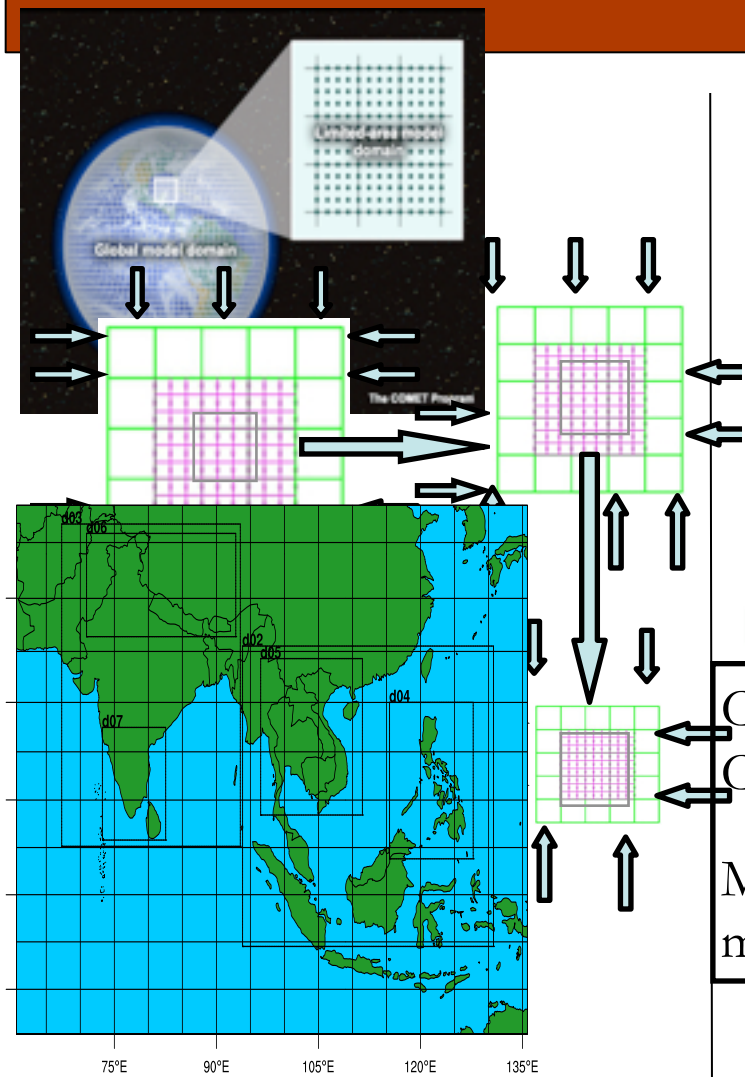
Handbook and Proceedings of First Training on
CLIMATE CHANGE PROJECTIONS DOWNSCALING:
APPROACHES AND APPLICATIONS



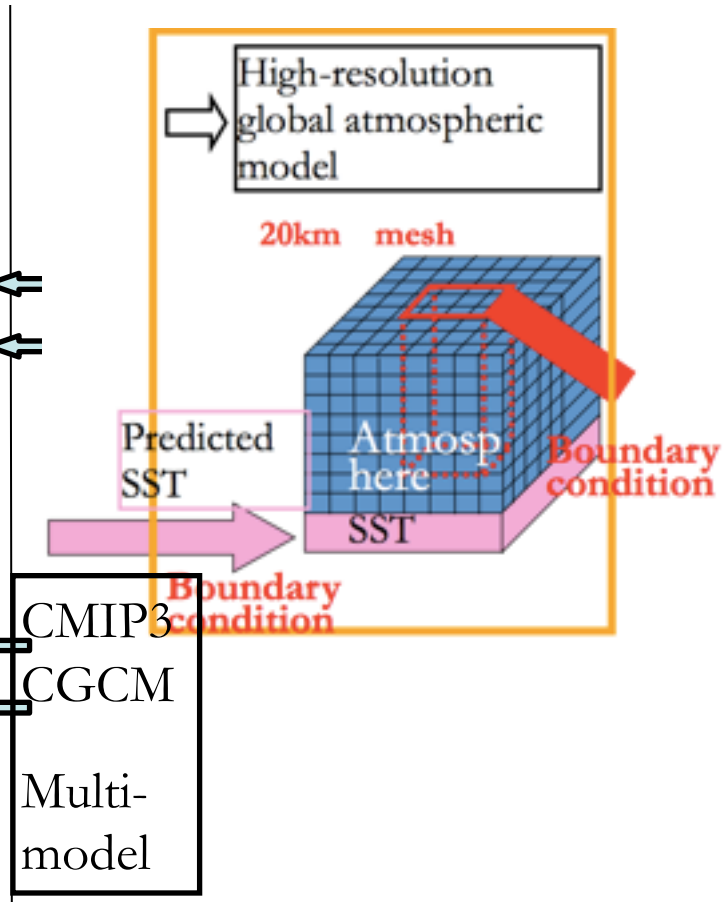
UN-CECAR
University Network for Climate and Ecosystems Change Adaptation Research

UNITED NATIONS UNIVERSITY
UNU-ISP
Institute for Sustainability and Peace

Downscaling Approaches



Weather Researchand Forecasting (WRF) Model of NCAR, USA



Meteorological Research Institute (MRI), JAPAN

Statistical Downscaling

$y = f(x)$

Relation between large scale predictors from global models and local scale parameters

University of Tokyo

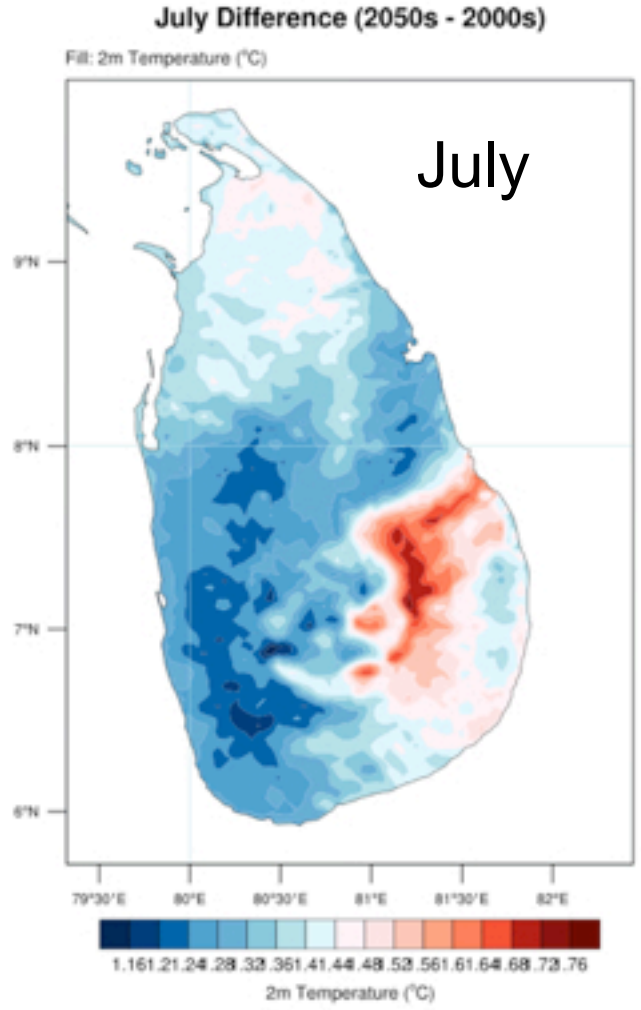
Bias Correction to DD products

Adjust values based on CDF or observed data (Gama distribution)

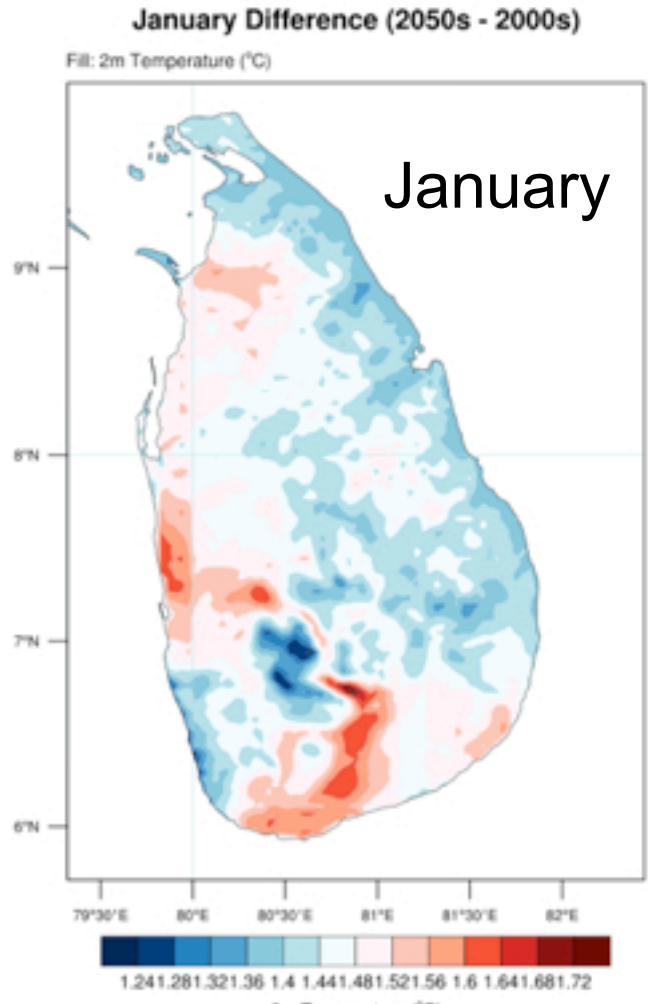
UNU

WRF climate projections D/S (4-12km)

3 year control run- 1983, 1985 and 1989 completed
2006-2035 and 2056-2085 projections completed for training exercise - SL. Large-scale provided by the NCAR CCSM4 AR5 RCP8.5 CMIP5 simulation (this is a 'business as usual' emission scenario).



Temperature differences 2050s - 2000s (NCAR, WRF)



Course 1: Downscaling Methods

	Morning Session (9:30-11:00 and 11:30-13:00)	Afternoon Session (14:00-15:30 and 16:00- 17:30)
DAY 1	Science of Climate Change and Downscaling Prof. U.C. Mohanty (Indian Institute of Technology, India)	Dynamical Downscaling Prof. Robert Oglesby (University of Nebraska Lincoln, USA)
DAY 2	Dynamical Downscaling Prof. Robert Oglesby (University of Nebraska Lincoln, USA)	Dynamical Downscaling Prof. Clinton Rowe (University of Nebraska Lincoln, USA)
DAY 3	Dynamical Downscaling Dr. Shoji Kusunoki (Meteorological Research Institute, Japan)	Dynamical Downscaling Dr. Shoji Kusunoki (Meteorological Research Institute, Japan)
DAY 4	Statistical Downscaling Prof. Toshio Koike (University of Tokyo, Japan)	Statistical Downscaling/National Programs Prof. Toshio Koike (University of Tokyo) and Prof. Tran Thuc (Institute of Meteorology, Hydrology and Environment Vietnam)
DAY 5	Risk Assessment/Short term and longterm Prof. Srikantha Herath (University of Tokyo/ UNU-ISP) Hands on Exercises, Data Import, Changes to Design storms	Hands on Exercises, Data Import, Changes to Design storms, MRI/ WRF comparison Group Discussion and Reporting

Course 2: Parallel Sessions on Impacts on Floods and Impacts on Rice Production

	Morning Session (9:30-11:00 and 11:30-13:00)	Afternoon Session (14:00-15:30 and 16:00- 17:30)
DAY 6	Overview of Downscaling Methods Prof. Bob Oglesby/Prof. Herath (NCAR/ UNU-ISP)	Geographic Information System (GIS) Dr. Lal Samarakoon (Asian Institute of Technology, Thailand) and Mr. Shigeru Nakamura (Nippon Koei, Japan)
	Parallel Session (Morning and Afternoon Session)	
DAY 7	Session 2A: Impacts on Floods Prof. Srikantha Herath (University of Tokyo/ UNU-ISP)	Session 2B: Impacts on Rice Production Dr. Dillip Swain (Indian Institute of Technology, India)
DAY 8	Session 2A: Impacts on Floods Prof. Srikantha Herath (University of Tokyo/ UNU-ISP)	Session 2B: Impacts on Rice Production Dr. Dillip Swain (Indian Institute of Technology, India)
DAY 9	Session 2A: Impacts on Floods Mr. Shigeru Nakamura and Dr. Priyantha Hunukumbura (Nippon Koei, Japan)	Session 2B: Impacts on Rice Production Dr. Lal Samarakoon and Mr. Kavinda Gunasekera (Asian Institute of Technology, Thailand)
	Common Session	
DAY 10	Communicating Climate Information Dr. Sarah Opitz-Stapleton (Institute for Social and Environmental Transition, USA) and Asia Pacific Network (APN)	

UN-CECAR WEBSITE PLATFORM (http://uncecar.unu.edu)

UNCECAR University Network for Climate and Ecosystems Change Adaptation Research

ABOUT RESEARCH COURSES EVENTS NEWS RESOURCES CONTACT US

Research
Program Development Ongoing Collaborative

Courses
Climate Change Downscaling Approaches and Applications

Events
31 Oct Second International Conference on Indian...

Stay Updated

WEBSITES MAIN CONTENTS

UN-CECAR
University Network for Climate and Ecosystems Change Adaptation Research

UNITED NATIONS UNIVERSITY
UNU-ISP
Institute for Sustainability and Peace

Thank You