Red Mexicana de Investigación Ecológica de Largo Plazo
(Mex-LTER)
Opportunities for international collaborations

Manuel Maass
Centro de Investigaciones en Ecosistemas
UNAM, Campus Morelia

www.mexlter.org.mx
Runoff in 5 Small Watersheds in Chamela

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International Environmental Agenda

GTOS
IGBP
ILTER
MA
SCOPE
CEC
Mex-LTER

11/Nov/03
History of the initiative...

1981 UNAM-UGA-Coweeta Hydrologic Lab.
1985 Zoquiapan/Andrews.
1993 First ILTER Meeting, Estes Park, CO.
1995 Comparative LTER between Sevilleta (UNM), La Jornada del Muerto (NMSU) and Mapimí (Instituto de Ecología, A.C.).
1999 Establishment of the MEX-LTER "Creation" Committee.
2001 Official Recognition by CONACYT.
2002 Official Recognition by ILTER.

October 2004 Official launch of Mex-LTER
CHAMELA Mex-LTER

3 Academic groups

Grupo “Cuencas”
Grupo “Cuencas”

1985: 1 Inv.
1995: 10 Inv. + 2
2000: 3 more + 2
2013: A total of 28 Inv.
Mex-LTER groups in 2004

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There are 150 researchers from more than 20 institutions involved in the Mexican LTER Network.
Monitoring....

- **Background information.** The absolute minimum information required.
- **Level 1** will be required within the first year of the study.
- **Level 2** will be required within the first 5 years;
- **Level 3** is the desirable monitoring to be implemented progressively according to the specific conditions and characteristics of the sites.

Workshops will be carried out to discuss and determine the specific variables, periodicity and methods of the survey of monitoring schemes.
Comisión Dictaminadora de la Red MexLTER

- Daniel LLuch (CICIMAR).
- Don E. Wilson (OTS).
- Elva Escobar (I de Ciencias del Mar y Limnología, UNAM).
- Exequiel Ezcurra (University of California).
- José Sarukhán (Instituto de Ecología, UNAM).
Mex-LTER Executive Committee (2004)
Gráfica 4: precipitación promedio en los 11 sitios
Core Areas of Research

What are the patterns and controls of ecosystem primary productivity?

What are the patterns and control of water, carbon and nutrients dynamics in ecosystems?

What is the role of biodiversity in the structure and functioning of ecosystem?

What are the patterns and frequency of ecosystem disturbances?

What are the effects of climate change on the structure and functioning of ecosystems?

What are the interactions at the interface level between managed and natural ecosystems?

What are the criteria for ecosystem management (use, conservation & restoration?)
Evolution of Mex-LTER

- Long Term **Ecological** Research
- Long Term **Ecosystem** Research
- Long Term **Socio - Ecological** Research
- Long Term **Socio - Ecosystem** Research

- MULTI-Discipline
- INTER-Discipline
- TRANS-Discipline
Mex-LTER Socio-Ecosystem agenda

How demographic changes affects the decision and management practices of local and regional socio-ecosystem?

How are the economic valorization / relationships of ecosystem services?

What are the structure and functioning of local social institutions (governance) related with the management of socio-ecosystems?

What is the roll of information and education (formal & non formal) in the socio-ecosystem management decisions?

How is the environmental culture (perceptions and expectations) of local settlers in relation of the transformation of their socio-ecosystems?

What are the consequences of transforming the local socio-ecosystems in the context of vulnerability?
Hydrological Demands of Natural Ecosystems in México: Phase 1

a Mex-LTER strategic project

General objective (long term)

“Evaluate the hydrologic resilience of major natural ecosystems in México, in order to identify their water requirements to maintain the functional integrity required to supply ecosystem services to society”
Evaluate the resilience capacity of 10 main ecosystems spread all over México, measured in terms of their hydrological processes. The idea is to find out what kind of water (in terms of its quantity, quality and regime) does a natural ecosystem require to maintain its functional integrity and provide ecosystem services to society.

**Hydrologic requirements of natural ecosystems in Mexico: Phase 1. A Mexican Long Term Ecological Research Network (Mex-LTER) strategic project**

- Development of a comparable Geographic Information System
- Rescue (and place on line) historical climatic & hydrological data available for each basin
- Identify the main sources of water to the ecosystem
- Calculate the water balance
- Identify main water users in the basin
- Evaluate ecosystems services awareness among main water users
- Launch a long term socio ecological monitoring program
- Prepare a first integrated assessment of the water requirements of main ecosystems in Mexico
Community Monitoring of Water Quality in 11 Contrasting Basins in México

Objectives

Provide information, tools and training required to the design and implementation of a long-term water monitoring (quality, quantity, regime) with the participation of the local community within the 11 Mex-LTER basins.
Each site will have:

**Personal**
- Water quality Technician
- Monitoring Technician
- Social Study Technician

**Equipment**
- Laboratory equipment
- Field equipment
- Laptop
- Vehicle

**Travel**
- Training
- Workshops
- Monitoring
- Social Surveys

**Supplies**
- Field work
- Lab work
- Monitoring kit
- Development
- Office
Proyecto ROBIN

Role Of Biodiversity In climate change mitigation

Coordinator: Dr. Terry Parr

Collaborative Project
(large scale integrating project)

Topic FP7 ENV-2011.2.1.4.1
Potential of biodiversity and ecosystems for the mitigation of climate change

9 de marzo de 2011
In Europe:
7. NERC, CEH (UK)
8. Alterra (NL)
9. University of Klagenfurt (AT)
10. Wageningen University (NL)
11. PIK (DE)
12. University of Madrid (ES)

In Central and South America:
1. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (MX)
2. Empresa Brasileira de Pesquisa Agropecuaria (BR)
3. Instituto Boliviano de Investigación Forestal Asociacion (BO)
4. Instituto de Ecología (MX)
5. Universidad Nacional Autonoma de Mexico (MX)
6. Guyana Forestry Commission (GY)
Role of Biodiversity in Climate Change Mitigation
ROBIN objectives

1. Quantify the role of biodiversity to mitigate the effect of climate change.
2. Quantify the local and regional interactions between biodiversity, land use and key ecosystem services.
3. Evaluate socio-ecological consequences of changes in biodiversity and ecosystem services under climate change scenarios.
4. Evaluate current actions and mitigation policies.
5. Analyze the impact of alternative scenarios of land use.
6. Provide information for land use planning.
Working Scales

Regions
Amazonia (Guiana Shield, Brazil & Bolivia) and Mesoamerica (Mex – CR & Panama)
- Natural (primary) vegetation is tropical rain-forest but other land uses.
- Also transition zones between forest and grasslands.

Sites
At least 9 sites in the Amazonian region and 7 in Mesoamerica.
- >500 km$^2$ to 10,000 km$^2$.
- Transition from primary forests to agricultural ecosystems.
- They are mostly multi-functional landscape.
- Relatively data rich.

Sub-sets of these sites will be used for the participatory approaches and the case-study work on specific ecosystem services and trade-offs affected by biodiversity (e.g. disease mitigation, invasive species, food and water security issues).

Plots
Small plots (<4 km$^2$) located in single land-cover/land-use/ecosystem types that can provide data on biodiversity relevant to:
- establish biodiversity and climate change relationships.
- develop, test and validate theoretical relationships and models.
- calibrate and validate remote sensing data and products.
Alianza del Pacífico

La Alianza del Pacífico es una propuesta de bloque comercial entre cuatro países de América Latina.

Esta propuesta se dio a conocer en Lima, Perú el 28 de abril del 2011. El proyecto fue una iniciativa del entonces presidente del Perú; Alan García Pérez con el propósito de profundizar la integración entre estas economías y definir acciones conjuntas para la vinculación comercial con Asia Pacífico, sobre la base de los acuerdos comerciales bilaterales existentes entre los estados parte.

Crear una Red de Investigación Científica y Técnica en materia de Cambio Climático.
Internacional Long Term Ecological Research Network

www.ilternet.edu
A Brief History (Terry Parr)

Growth of ILTER: Member Networks

- ILTER Strategic Plan
- Early implementation phase
- Legal entity status
- New By-laws
- Capacity building
- US/NSF
Over 600 LTER Sites
40 Countries
All Continents
ILTERR Agenda

✓ Communication (new technologies)
We need to improve top-down communication
ILTER’s vision is a world in which science helps prevent and solve environmental and socio-ecological problems
Information Management Strategy

• Discovery of data
  – XML based Ecological Metadata Language (EML)
  – Search System Based on Multi-lingual Thesaurus
  – Regional Metacat Servers

• Adoption of DEIMS (Drupal Ecological Information Management System) Web-Based Tool for Centralized and Network/Site Use
  – EML Entry Tool and Site Description Entry and Search

• Data access and exchange - interoperability
  – Distributed data storage (data stored at sites or networks)
  – Development of Tools to Facilitate Data Reuse in Multiple Languages
ILTER Metadata Catalog –
For data discovery - EML will be the metadata standard for ILTER.

Search in one language: return EML documents in multiple languages stored in ILTER Regional Metacats
Network: Mexico LTER Network

Country: Mexico
Chair: Miguel Equihua
Web Page: www.mexlter.org.mx

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Web Page: www.mexlter.org.mx
Altitude / Annual Precipitation

Same low altitude, but different precipitation

Different altitude, but same low precipitation
ILTER Agenda

Communication (new technologies)

☑️ Evaluation (different capabilities but same commitment)
We all sign a "Letters of Intent" or "Memorandum of Understanding" clearly setting out the “dual obligations of the individual LTER networks to ILTER and of ILTER towards national networks”.

However, we recognize that not all country networks have the same economic, human and organizational capabilities. Therefore, we can’t expect the same level of response or speed of consolidation in all country networks.

We recognize different levels of development among countries, and request same commitment but different level of obligations according to their stage of development.
Fully active national network are those with a well established ongoing LTER research and monitoring program, with a secure source of money for several years ahead, and with a critical mass of scientists ready to respond properly to almost any ILTER suggested activities.

Consolidating national networks are those with an established program and a reasonable research capacity, but with a limited source of money which constrains their capability to respond to all ILTER activities.

Emerging national networks are those with a low research capacity and fully dependent of ILTER support to respond to an ILTER activity.

Inactive national networks are those that, for different reasons, are not attending ILTER call for action.
Stage / Type of Development Among ILTER Country Members
Stage / Type of Development Among ILTER Country Members

- Fully Active member
- Consolidating member
- Emerging member
- Inactive member

- Lack of commitment
- Lost of interest
- Lost of the leader
- Country crisis
Few results in a glimpse

In-degree centrality

Betweenness

US-LTER, UK & México

México
ILTER Agenda

Communication (new technologies)

Evaluation (different capabilities but same commitment)

✓ Bottom up approach (the wisdom & the power of the crowds)
We need to keep and promote the bottom-up participation strategy!
Network Level Collaboration between US and Mexico Ecohydrology Research

James Vose & Fred Scatena........... Kristin Vanderbilt

Catalyzing New International Collaborations

US/Mex-LTER Socio-Ecohydrology Research

21 Researchers
9 Students
11 LTER Sites

US
CAP
CWT
FCE
LUQ
SEV

Mex
ALC
CHA
ECO
GRA
MAN
MAP
How do biophysical and social attributes facilitate or limit the ability to build the resilience of social ecological systems such that sustainability of water is ensured in the face of internally and externally driven changes?

Specifically, we propose to conduct a comparison among long-term research sites to enhance understanding of:

✓ How ecohydrological and social conditions constrain possible outcomes of sustainable socioecological systems (e.g. environmental flows, maintenance of biodiversity).

✓ How water quality and availability, among other ecosystem services associated with water, are affected by the interacting drivers of climate change, population, economic, and land-use changes?

✓ The importance of local knowledge and perception, especially of ecosystem services, in strengthening and stimulating sustainable water governance.

✓ The role of stakeholder engagement, partnering with practitioners, and the co-production of both knowledge and decisions to building adaptive capacity.
The Northern Rockies NEON domain in the US We propose to use this region as a model for developing research collaboration that can be expanded to many regions of the world.

How can we reduce the vulnerability of natural and human systems in complex mountain landscapes? This includes vulnerability from climate change/variability, land-use change, and hazards such as wildfires, floods, and insect/disease outbreaks on engineered and natural hydrologic structures and human communities.
The main objectives.....

✓ to facilitate integration of existing programs and studies;
✓ to design collaborative interactive research, education, and governance projects; and
✓ to create partnerships that better link new informatics to produce linked, scalable models that will help inform management decisions at multiple scales and better link non-governmental and governmental constituents who affect the resilience of these mountain systems.

New international examples are the international Mountain LTER Network sites (Niwot Ridge US, Stubai Valley, Austria, Tyrolean Central Alps, Northwestern Alps, Italy, three Mexican LTER mountain sites, and the Himalayan mountains of Asia that straddle 10 countries.)
Interactions among ecosystem services, ecosystem dynamics, and human outcomes and behavior

Submitted by the ILTER Science Agenda Committee
Chair Patrick Bourgeron

This proposal is the first network-level attempt by the ILTER network to address the linkages between ecosystem services (ES) and human outcomes and behavior, and how they influence each other in biomes.

The work will be conducted by developing site-specific feedback models for one selected site representing a biome for each member network.
“Integrative Science for Society and the Environment” (ISSE) framework (Collins et al. 2007)

Six major ecosystem services and tradeoffs

Shift in the delivery of Ecosystem services

Major regimen shift and key threshold interactions
Biome/Network

- Tropical coniferous: *Malawi*
- Tropical dry broad-leaf forest: Mexico, Thailand, Venezuela
- Tropical moist broad-leaf: Philippines, Taiwan, Brazil
- Temperate broad-leaf mixed forest: France, Japan, UK, Korea, Australia, Germany, Poland, Romania
- Deserts: *Israel, South Africa, Namibia*
- Flooded grassland/savanna: *Malawi*
- Temperate coniferous/boreal: Italy, Mongolia, USA, Czech R., Germany, Finland, Slovakia, Chile, Austria
- Med Woodlands: *Spain, Portugal, Hungary*
- Temp Steppe, Woodlands: *Hungary, Romania*
ILTER initiative, “Socio-biogeochemistry of nitrogen cascading and interactions”
PI: Hideaki Shibata (Japan LTER, Science Committee Member of ILTER, Hokkaido University, Japan, shiba@fsc.hokudai.ac.jp)

This initiative will synthesize the current understandings and future needs based on the individual research outcomes in each ILTER member network.

We are willing to publish the synthesis paper within two years.

Main questions:

• What is the current problems and trends of nitrogen biogeochemistry in the coupled ecological and human systems?

• What is the critical processes, drivers, feedback and thresholds to cause the abrupt changes of the nitrogen socio-biogeochemistry regionally and globally?

Looking for....

✓ What are possible research questions for the synthesis?

✓ Key publications from your network to be utilized for the synthesis.

✓ Who is the possible candidates of the contributors for discussing and writing teams for synthesis paper

✓ Any other suggestions, comments and relevant information
Using long-term ecosystem service and biodiversity data to study the impacts of and adaptation options in response to climate change: insights from the global ILTER sites network.

Petteri Vihervaara1*, Dalia D'Amato1, Martin Forsius1, Per Angelstam2, Cornelia Baessler3, Steffen Zacharias3, Patricia Balvanera4, Bazartseren Boldgiv5, Patrick Bourgeron6, Jan Dick7, Robert Kanka8, Stefan Kloltz3, Manuel Maass4, Viesturs Melecis9, Petr Petřík10, Hideaki Shibata11, Jianwu Tang12, Jill Thompson7.

Finland, Sweden, Austria, México, Mongolia, USA, UK, Slovakia, Latvia, Czech Republic, Japan, Puerto Rico
ILTER-project: Citizen forum – a website which facilitates dialogue between scientists and the society (Eeva Furman & Riikka Paloniemi, Finnish Environment Institute, SYKE, FinLTSER, Finland)

The aim of the project is to build an internet-based communication tool and research infra for national LTER networks (electronic forum). The forum will facilitate science-society dialogue and in the future, collect research data on behavior and attitudes on questions related to environmental problems and pro-environmental behaviour.

Research questions could include:

✓ How are issues of adaptation to climate change discussed in different countries and LTSER platforms? How does an electronic panel function as a platform for dialogue of environmental issues?
✓ What is the difference in answers if you use traditional questionnaires or an electronic dialogue method which allows exchange of views

The forum contains three elements:

• A discussion group on current environmental policy issues
• A questionnaire to be used to gather quantitative data
• In each LTSER area, a panel of around 20 (later 300-500) households that commit themselves to participate in discussion groups and fill in questionnaires for an extended period of time
ILTER Agenda

Communication (new technologies)

Evaluation (different capabilities but same commitment)

Bottom up approach (the wisdom of the crowds)

☑ Capacity building (student participation)
ILTER Agenda

Communication (new technologies)

Evaluation (different capabilities but same commitment)

Bottom up approach (the wisdom of the crowds)

Capacity building (student participation)

✓ Internal institutional strength (good practices)
ILTER Agenda

Communication (new technologies)

Evaluation (different capabilities but same commitment)

Bottom up approach (the wisdom of the crowds)

Capacity building (student participation)

Internal institutional strength (good practices)

✓ Collaboration (visibility and capacity)
Development of External Partnerships 2008-2012

ILTER links to many other International Organisations to Deliver Scientific information to scientists, policy makers, and the public to meet the needs of decision makers at multiple levels

- GEO/Global Earth Observation System of Systems
  - Global Biodiversity Observation System – ILTER recognised as key in situ data provider
  - Links to Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES)
- Global Biodiversity Information Facility (GBIF – MoU)
  - Taxonomic Data Working Group (TDWG)
- UNEP – Climate Change Adaptation Network (through CERN)
- UNESCO International Hydrological Programme
- UNESCO Biosphere Reserves
- IGBP/IHDP Global Land Project
- INTECOL
- ICSU – Grand Challenges

ILTER’s Public Policy Committee
ILTER is leading the development of the GEO BON Global Network of Biodiversity and Ecosystem Observation Sites.

✓ Pull together the "community of common interest"

✓ A meta-database of sites will (what sites can contribute and where there are gaps in coverage)

✓ Ways of sharing, synthesising and analysing site

Our preliminary definition of a site is: a contiguous area undertaking long-term co-located ecosystem-based measurements at appropriate scales for linking: (i) drivers of change; with (ii) loss or gain of biodiversity; and (iii) impacts on ecosystem processes and ecosystem services.
Main Idea....

Apply to the UK International Opportunities Fund with a proposal that aims to establish a global network of "Genetic Observatories".

LTER sites from the UK and US LTER networks are likely to be involved but they are also looking for about 15 other sites around the globe that are already undertaking some genetic work and would be willing to contribute to such a project.

Commitments.....

✓ provide some co-funding or in-kind support
✓ ultimately be willing to share data.
✓ In-kind participation (attending annual workshops to identify common research questions)
ILTER Agenda

Communication (new technologies)

Evaluation (different capabilities but same commitment)

Bottom up approach (the wisdom of the crowds)

Capacity building (student participation)

Internal institutional strength (good practices)

Collaboration (visibility and capacity)

✓ Networking (all scientist meetings)
Types of global initiatives

Synthesis
- SCOPE
- MA
- IPBES

Research
- LAND,
- Diversitas
- PECS

Societies
- INTECOL
- ATB

Monitoring
- GEOBON

Decision making
- CBD,
- UNFCC
ILTER Agenda

Communication (new technologies)

Evaluation (different capabilities but same commitment)

Bottom up approach (the wisdom of the crowds)

Capacity building (student participation)

Internal institutional strength (good practices)

Collaboration (visibility and capacity)

Networking (all science meetings)

✓ Growth (new countries and associated sites)
Member Networks

New Members

2007 – Finland, Japan, Philippines, Thailand
2008 – Spain, Portugal
2009 – Bulgaria, Serbia
2010 – Sweden
2011 – Chile

Should we go for individual groups membership?
Evolution of ILTER?

Long Term Ecological Research

Long Term Ecosystem Research

Long Term Socio-Ecological Research

Long Term Socio-Ecosystem Research

MULTI-Discipline

INTER-Discipline

TRANS-Discipline
Características del International Long Term Ecological Research (ILTER) Network

ICSU = Int. Council for Science  
IGBP = Int. Geosphere Biosphere Program  
GOSIC = Global Obs. Systems Inf. Center  
GBIF = Global Biodiversity Inf. Facility  
GEOSS = Group on Earth Obs. System of Systems  
MA = Millennium Ecosystem Assessment  
START = System for Analysis, Research and Training  
CIESIN = Center for Int. Earth Science Inf. Network

### Permantent sites

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<th><strong>Key de sitios</strong></th>
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<th><strong>Investigación de largo plazo</strong></th>
<th><strong>Seguimiento de largo plazo</strong></th>
<th><strong>Colaboración científica</strong></th>
<th><strong>Estandar. de mediciones y datos</strong></th>
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Almacenaje/ acceso a datos de l. p.  
Detección de tendencias globales  
Detección de tendencias nacionales  
Formación de recursos humanos  
Informar a tomadores de decisiones  
Socio-Ecosystem Research
¡Muchas Gracias

Manuel Maass
maass@oikos.unam.mx