Mexican Long Term Ecological Research Network

www.mexlter.org.mx

The Mex-LTER: building a network under human and economic restrictions

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International Environmental Agenda

Commission for Environmental Cooperation

Millennium Assesment

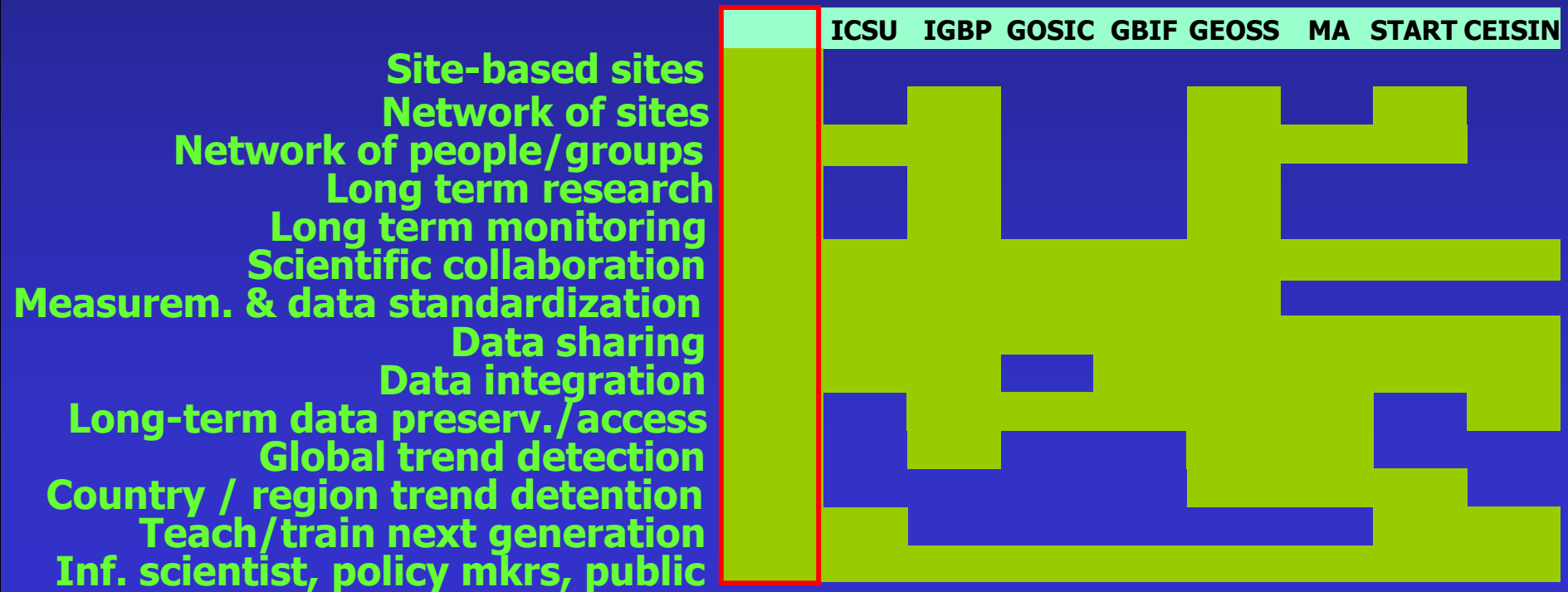
International Geosphere & Biosphere Program

Terrestrial Ecosystem Assessment & Monitoring program

Ecological Research program

Global environmental organizations Characteristics Comparison

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

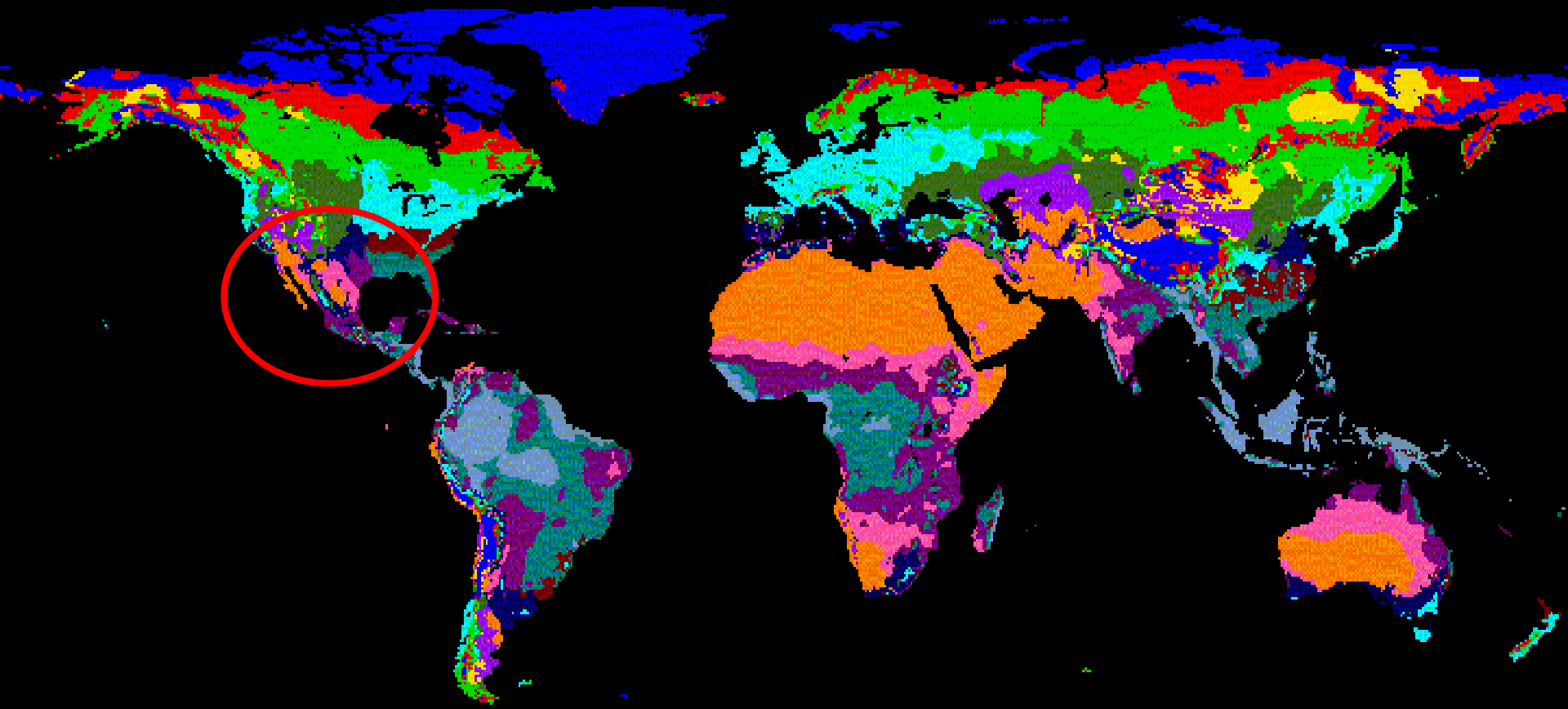


We conceive the Mex-LTER network as a large environmental assessing instrument (like a telescope) which allow us to deal with most pressing research questions.

However it requires a coordinated effort of a large number of scientist, in multiple sites and for a long time.

The challenge is enormous, as is the potential for collaboration!

How we can built such a network in Mexico?



CHAMELA in September

CHAMELA in January

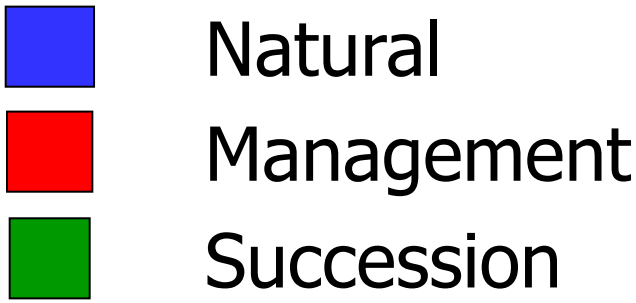
Tree main questions:

How is the structure and functioning of the tropical dry deciduous forest ecosystem at Chamela?

- **What is the impact of human activities on this ecosystem?**
- **How we can manage (conserve, use, restore) in a sustainable way this ecosystem?**

Historic Development

Original Plan



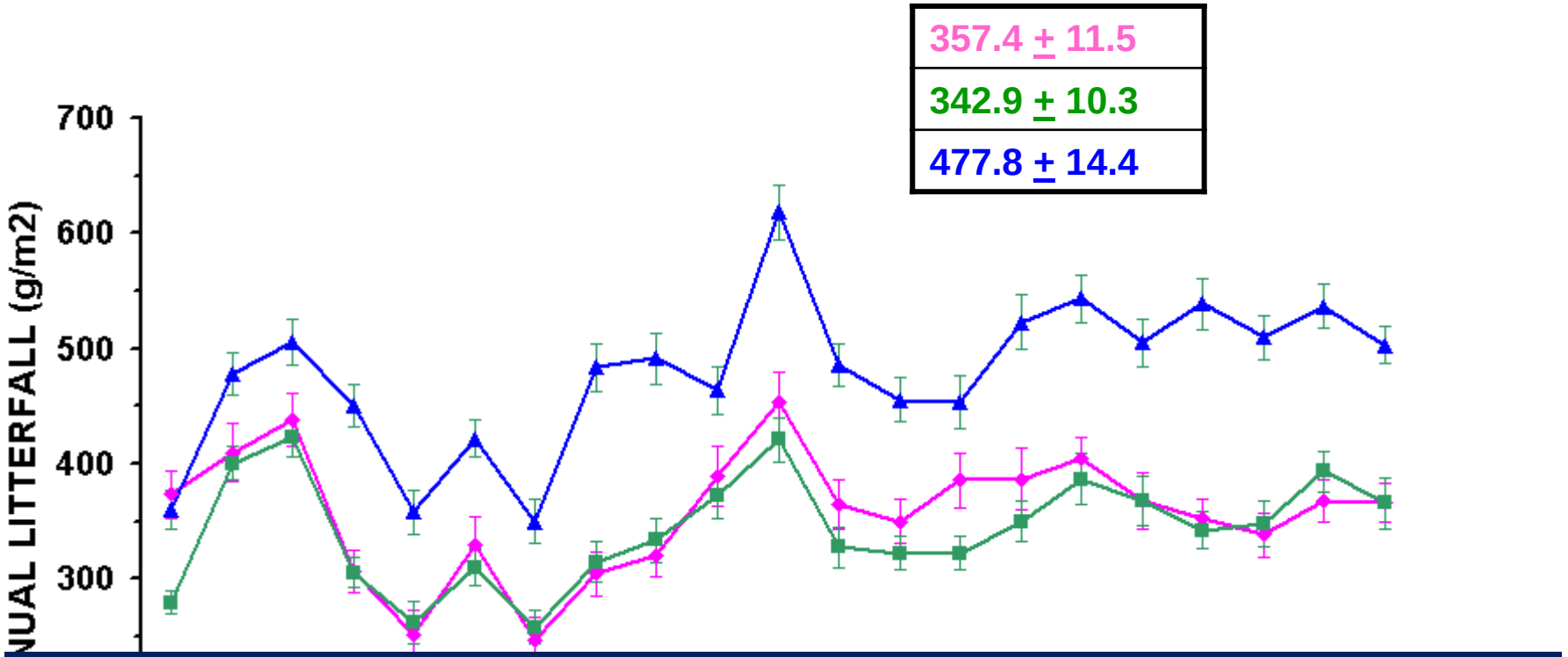
Runoff in 5 Small Watersheds in Chamela

Year	Ws-1	Ws-2	Ws-3	Ws-4	Ws-5	Avg.Runoff
1985						0

Total NPP at the Chamela Forest, México
(Martínez-Yrízar et al. 1996)

	Kg ha^{-1} y^{-1}
Above- ground Litterfall	
Litterfall	3 564
Leaf litter (2,854)	
Wood increment	2 400
Leaf herbivory	611
Understorey production	247
ABG-NPP	**6 822**
Below-ground	
Fine root production	4 230
Root increment	1 008
BLG herbivory	?
BLG-NPP	**5 238**
Total NPP= ABG + BLG	**12 060**

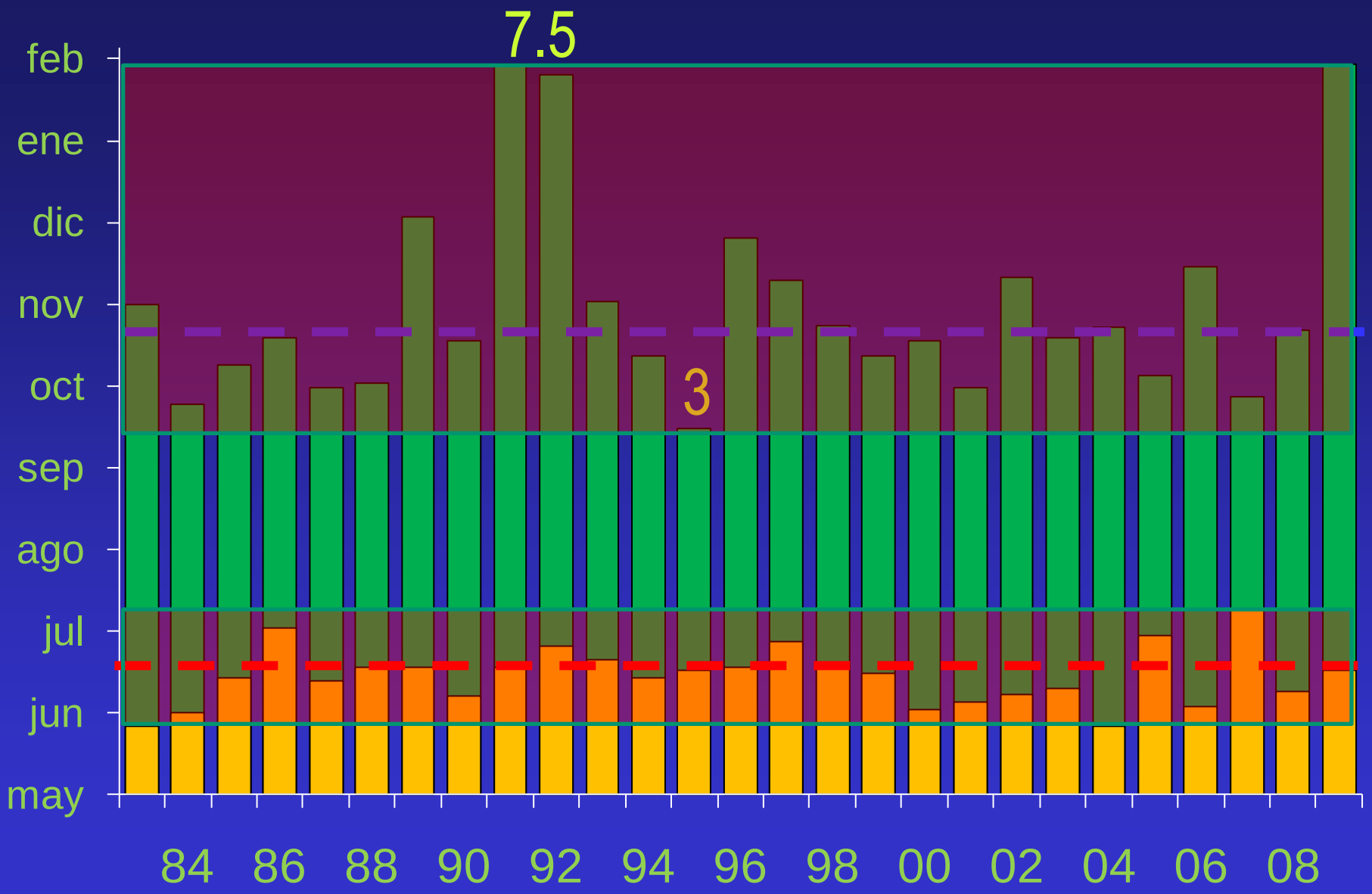
LITTER PRODUCTION (W1): INTERANNUAL VARIATION
Tropical Deciduous Forest at Chamela, Jalisco, MEXICO



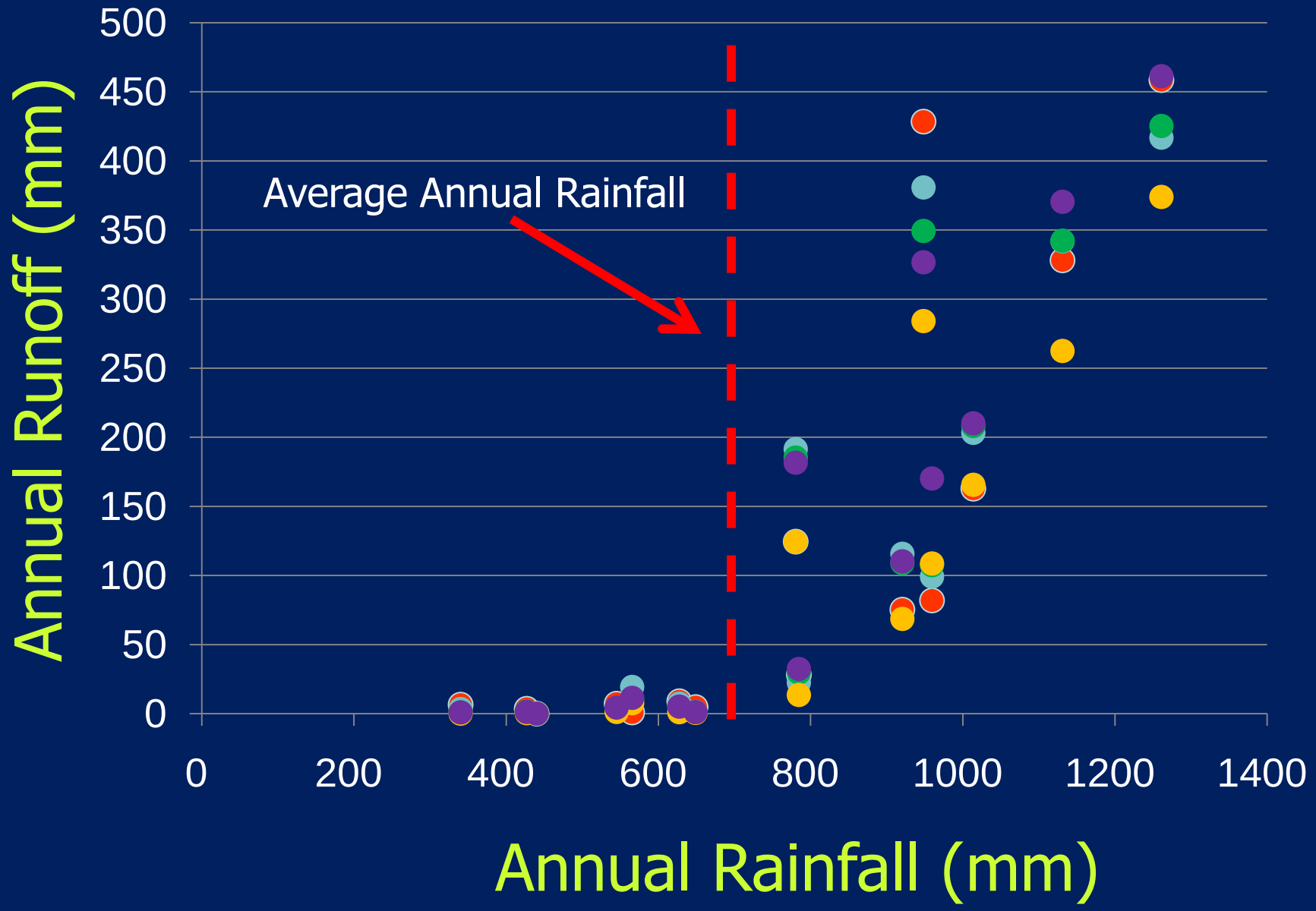
Using the leaf production ratio we estimated long-term NPP at Chamela

It vary from 8 to 20 Mg ha^{-1} y^{-1}

Rainy Season in the TDF of Chamela, Jal. Mex.



Runoff in 5 small Watersheds in Chamela



Wet Season

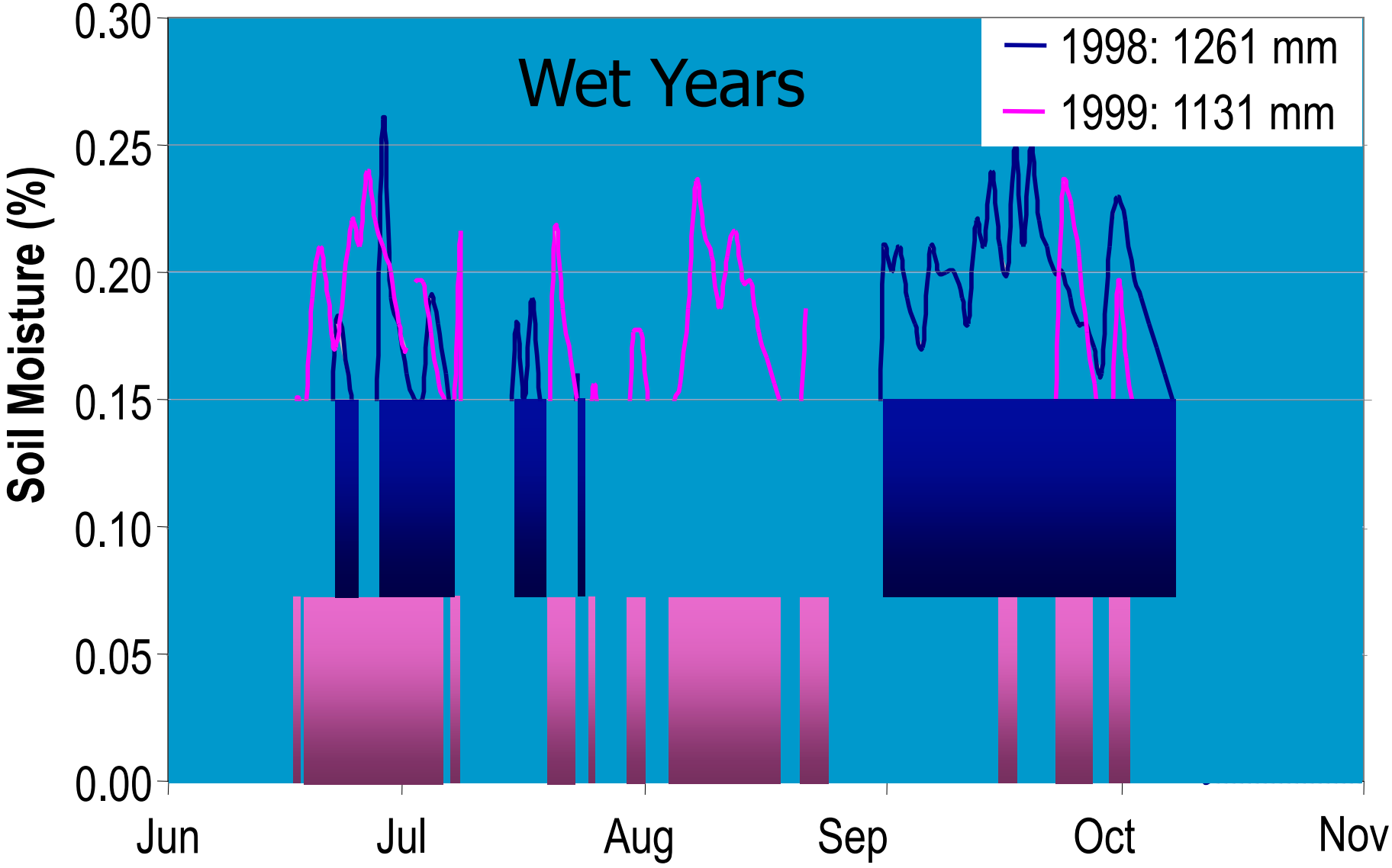
Wet Year

Wet Season

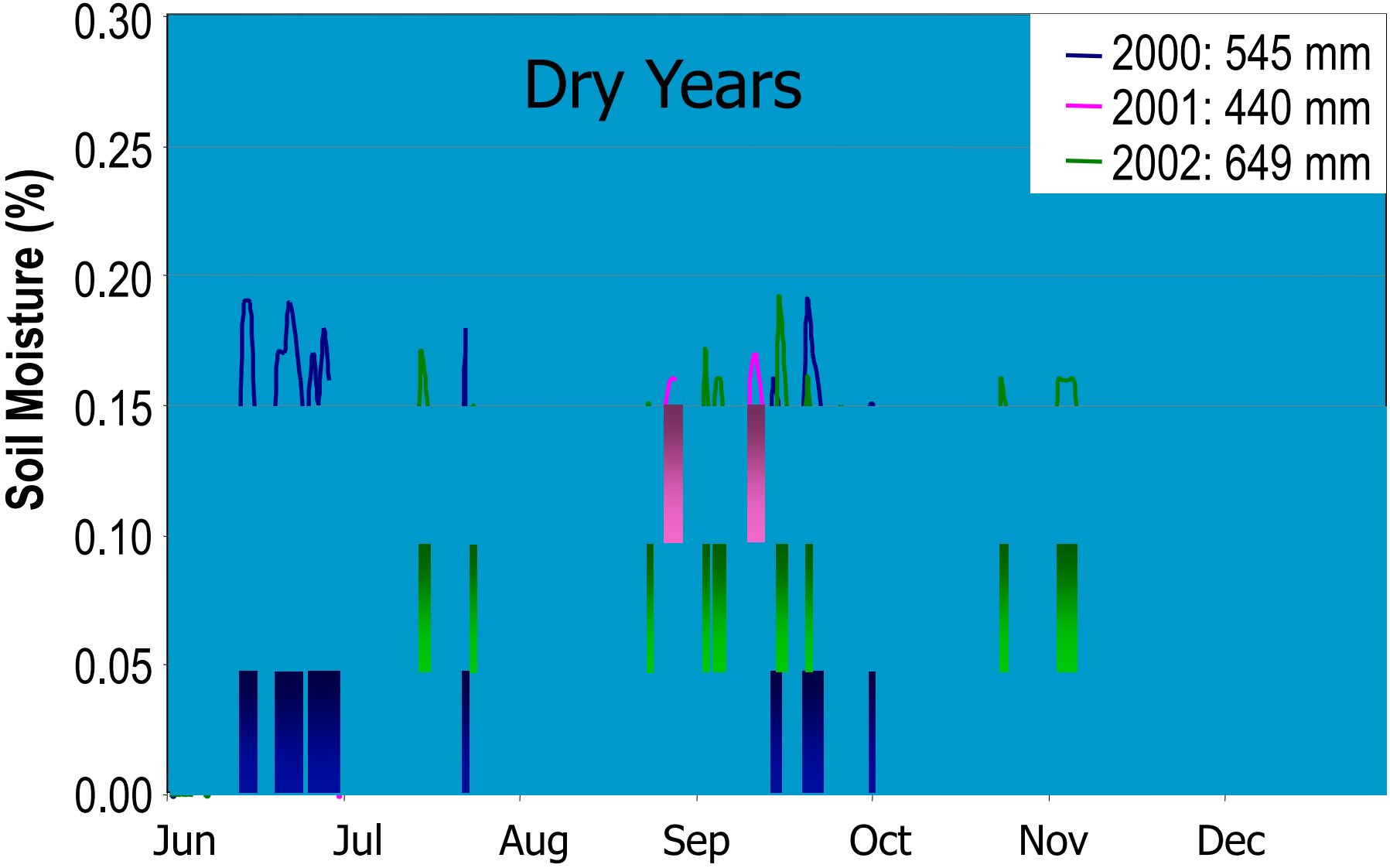
Dry Year

Photo: Víctor Jaramillo

Soil Moisture during wet years in a Tropical Deciduous Forest in Chamela, Jalisco, Mexico (Data: García Oliva et al.)



Soil Moisture during dry years in a Tropical Deciduous Forest in Chamela, Jalisco, Mexico (Data: García Oliva et al.)




HENRIETTE 1995
SERGIO 1978
ISMAEL 1995
PAUL 1978
HECTOR 1978
GILMA 1978
CARLOTTA 1988
IVA 1978
FLOSSIE 1995
NORMAN 1978
JOHN 1988
ALETTA 1978
CARLOTTA 1978
HECTOR 1988
KRISTY 1988
LANE 1988
DANIEL 1978
JULIETTE 1995
ROSA 1978
GIL 1995
BUD 1988
OLIVIA 1978
DANIEL 1988
KRISTY 1978
FICO 1978
EMILIA 1988
JOHN 1978
BUD 1978
BARBARA 1995
IVA 1988
MIRIAM 1988
FABIO 1988
MIRIAM 1978
30N
25N
20N
15N
10N
95W
90W
85W
100W
105W
110W
115W
120W
125W
130W
0
669mi

La Niña 1975-

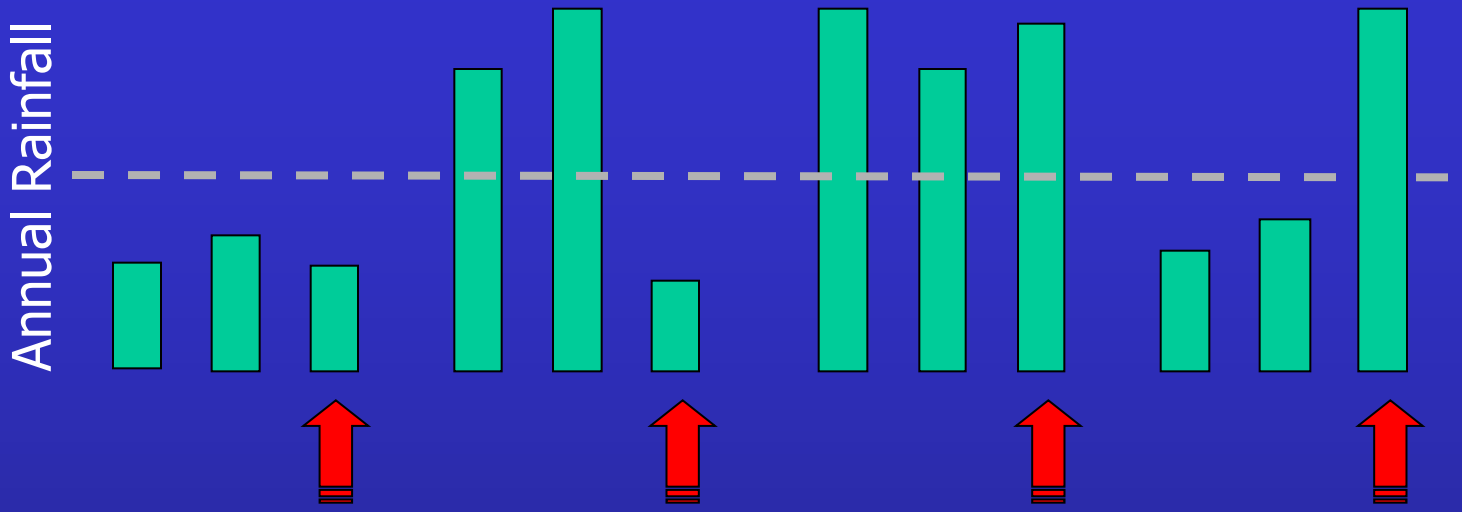

Louisiana
Mississippi
Florida
Texas
30N
25N
20N
15N
10N
125W
120W
115W
110W
105W
100W
95W
90W
85W
HILDA 1991
IGNACIO 1997
NORA 1997
KATHLEEN 1976
HECTOR 1994
FAUSTO 1990
OLIVIA 1994
LINDA 1997
ELIDA 1990
SIMON 1990
JAVIER 1986
FABIO 1982
IVA 1976
LINDA 1991
OLIVIA 1982
KAY 1986
GREG 1993
LANE 1994
ISIS 1986
KEVIN 1991
TRUDY 1990
JULIO 1990
SERGIO 1982
CRISTINA 1990
MIRIAM 1994
FEFA 1991
JOHN 1994
TARA 1982
IVA 1982
DIANA 1976
MIRIAM 1982
MADELINE 1986
SELMA 1987
CARLOS 1991
BLANCA 1991
JIMENA 1991
LANE 1982
HECTOR 1982
FELICIA 1997
MARIE 1990
JOVA 1987
CELESTE 1976
EUGENE 1993
KNUT 1987
ENRIQUE 1997
ENRIQUE 1991
GILMA 1982
KRISTY 1982
BLAS 1986
GWEN 1976
ILEANA 1994
JOVA 1993
ISELLE 1990
CELIA 1986
HYACINTH 1976
LIDIA 1987
DARBY 1986
CALVIN 1987
ODILE 1990
ALMA 1990
NORA 1991
PAUL 1982
LIZA 1976
RACHEL 1990
NAOMI 1976
ROSA 1994
CALVIN 1993
NEWTON 1986
VANCE 1990
LOWELL 1990
GUILLERMO 1991
GREG 1987
HILARY 1987
FRANK 1986
RAMON 1987
ROSA 1982
MARTY 1991
GENEVIEVE 1990
HILARY 1993
GUILLERMO 1997
MAX 1987
DANIEL 1982
PAULINE 1997
IRWIN 1987
LIDIA 1993
ROSLYN 1986
JOANNE 1976
RICK 1997
BLANCA 1997
ANDRES 1997
PAINE 1986
MADELINE 1976
0
587mi

El Niño 1975-

Precipitación (mm) en Chamela

1983- 2001

Ecosystem response to rainfall history



Unperturbed

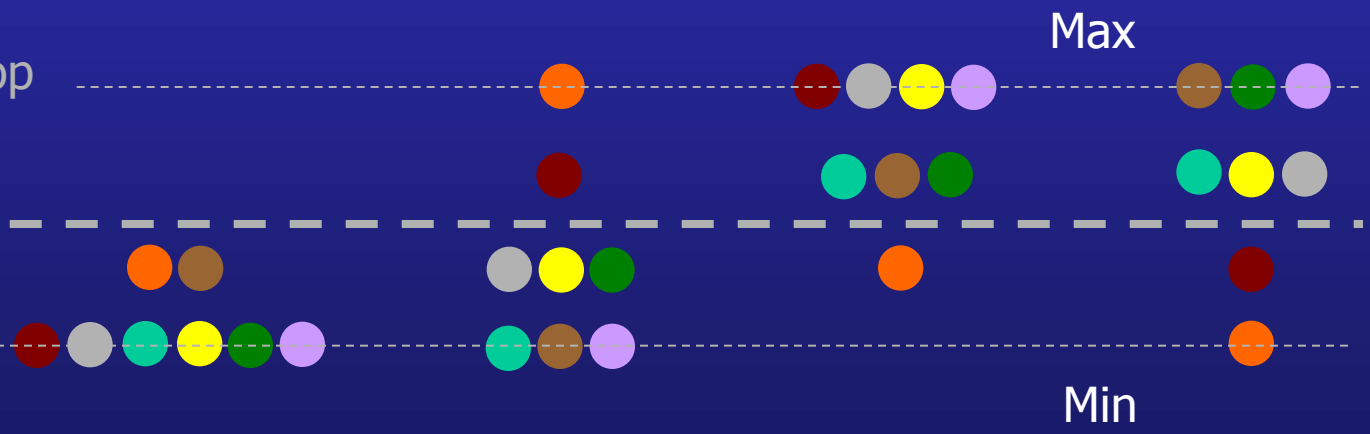
- Soil moisture
- NPP
- Litter standing crop

Management

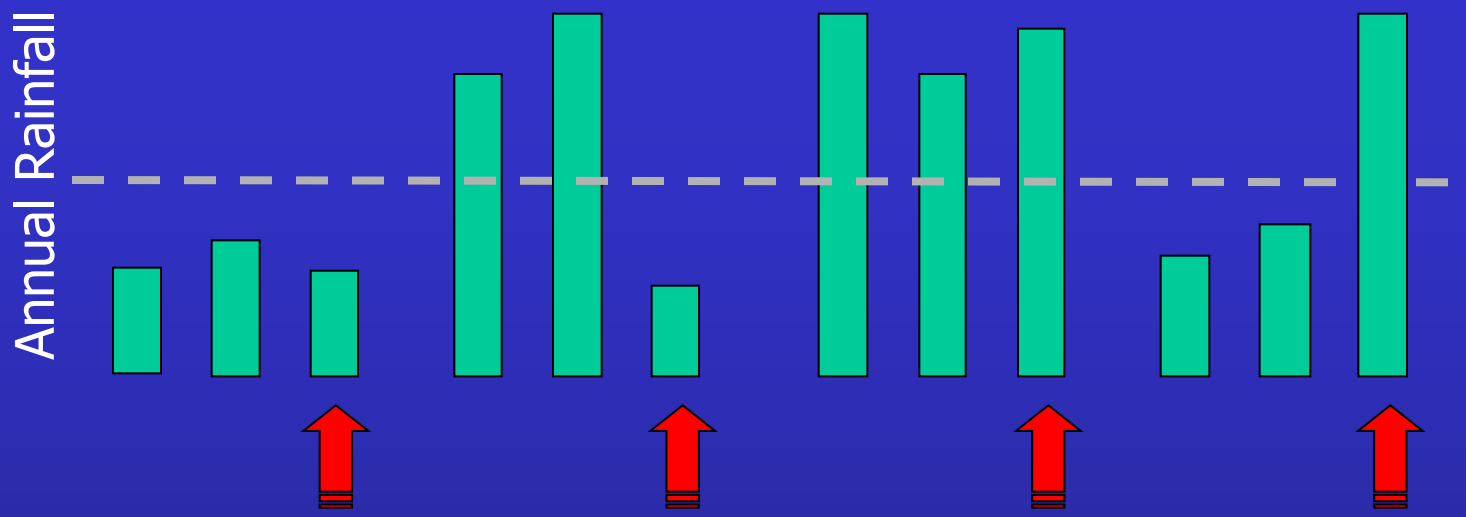
- Soil erosion
- Cattle heard size
- Over grazing

Recovery

- Coppicing capacity
- Recruiting



Ecosystem response to rainfall history



Unperturbed

- **Soil moisture**
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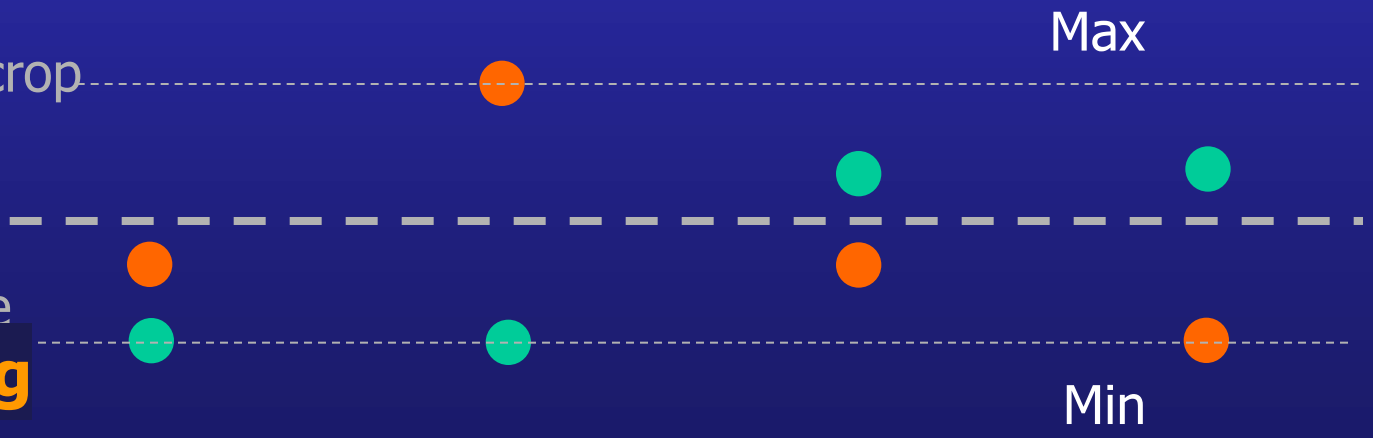


The process haven't been easy….

Financial resources

- *"We will support you for the next two years, then....we will see"*
- *"Generate your own resources.... joint the productive sector"*
- *"We can't hire him...and there is no new positions for the rest of the year"*
- *"If you are a group, you can ask up to 3 Mill $....if you are a Network up to 5".*
- *"Your project has been selected..... but the funds aren't available yet"*
- *"Here are your resources.....you have 2 months to use them all"*

Communication

- *"I don't understands what are you talking about…"*
- *"In short…what do you need / recommend?"*
- *"I sweat blood obtaining these data.....wait for the publication"*
- *"That is not what we agree on...."*

Vision

- *"This is a School of Biological Sciences and any one applying in to the PhD program must pass a biology test"*
- *"Were is the evolutionary question in your project?"*
- *"The primary result of your work must be a paper on a peer reviewed and indexed journal"*
- *Lets concentrate for now on those aspect we know well and then we will see"*
- "T*he candidate should have two postdoctoral years and at least 3 publications in major indexed journals"*

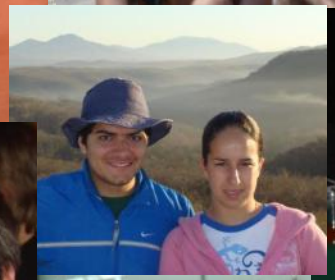
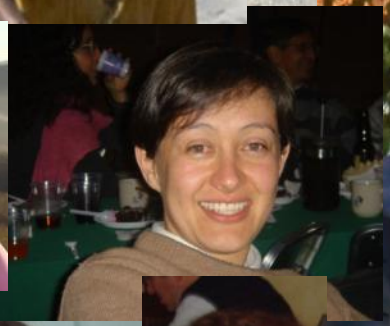
Team work

- *"If he/she is part of the group..... don't count me"*
- *"Only we know how to do the work properly"*
- *"If we get involved we will coordinate the effort"*
- *"Start the project and if everything goes well.... I may get involved"*
- *"Yes I remember we talked about it.....but we didn't sign an agreement"*
- *"Erase my presentation from your laptop...and from the recycle bin"*
- *"I will send it tomorrow…"*
- *"Yes I was committed but I now have so much work I will not longer participate"*
- *"In how many papers you are the first (or single) author?.... in how many you are a co-author?*
- *"Yes we agree on the rotation of the direction.... but I liked the chair"*

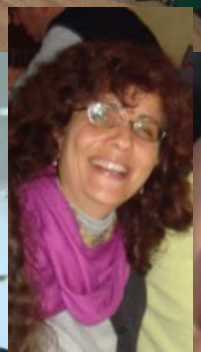






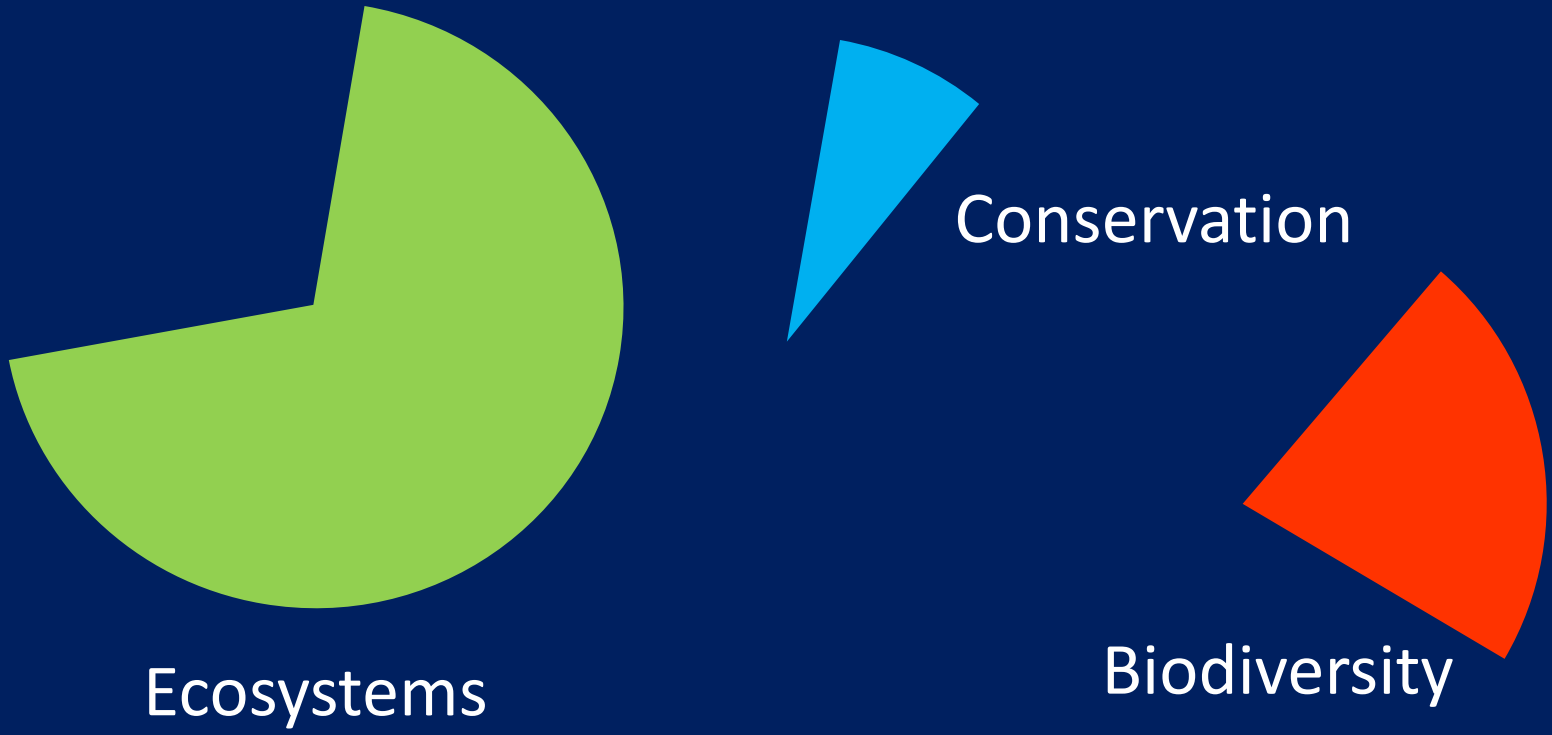




La investigación ecosistémica en Chamela: tres décadas de trabajo grupal

Grupo “Cuencas”

Long term research in the Chamela-Cuixmala Biosphere Reserve



CHAMELA Mex-LTER

One integrated solid group

Chamela Mex-LTER

26 Researches

Alfredo Pérez Jiménez
Alicia Castillo
Álvaro Miranda
Andrés García
Angelina Martínez Yrízar
Clara Tinoco
David Valenzuela
Enrique Martínez Meyer
Felipe García Oliva
Felipe Noguera Martínez
Gerardo Ceballos
Helena Cotler
Jorge H. Vega Rivera
Jorge López Blanco
José Sarukhán
Julieta Benítez
Ktherine Renton
Laura Barraza
Manuel Maass
Marisa Mazari
Mayra Gavito
Miguel A. Ortega Huerta
Patricia Balvanera
Ricardo Ayala
Víctor Jaramillo

10 Technician

36 Students

CHAMELA Mex-LTER

(Six institutions)

Institute of Biology

Centro de Investigaciones en Ecosistemas (CIEco)

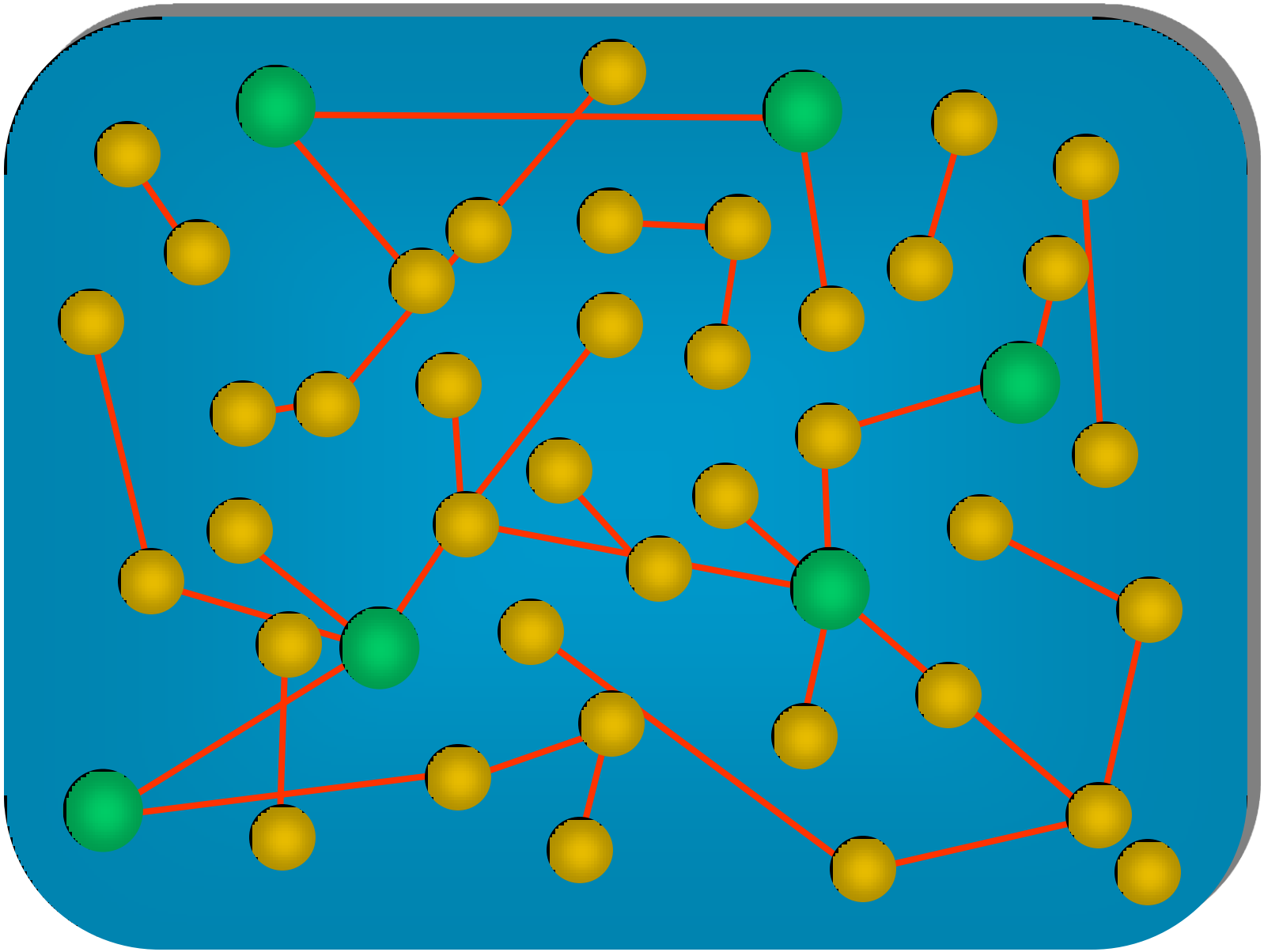
ILTER Network
40 countries

Red Mex-LTER
10 groups

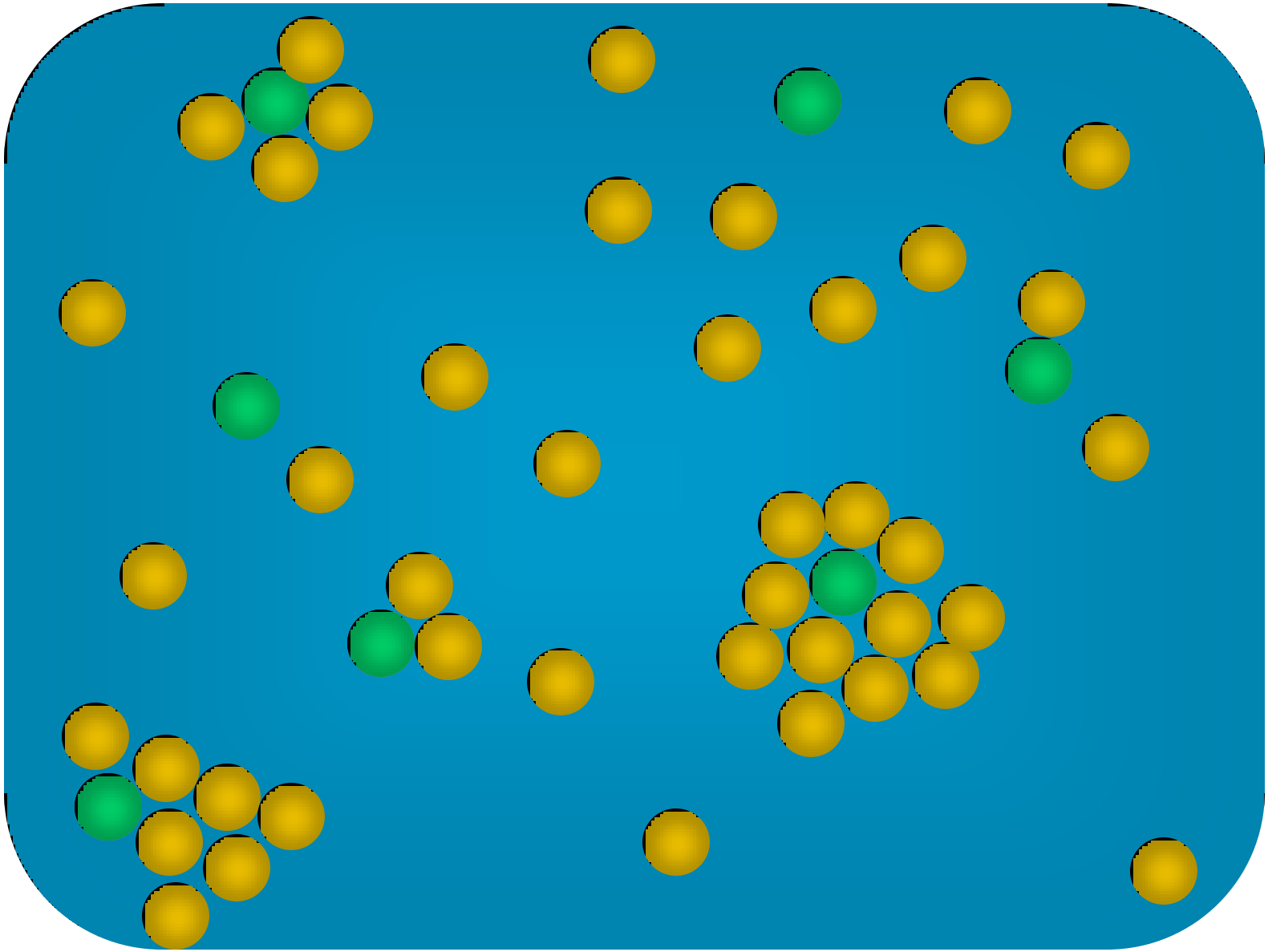
"Chamela
Mex-LTER"
26 Inv.

"Cuencas"
13 inv.

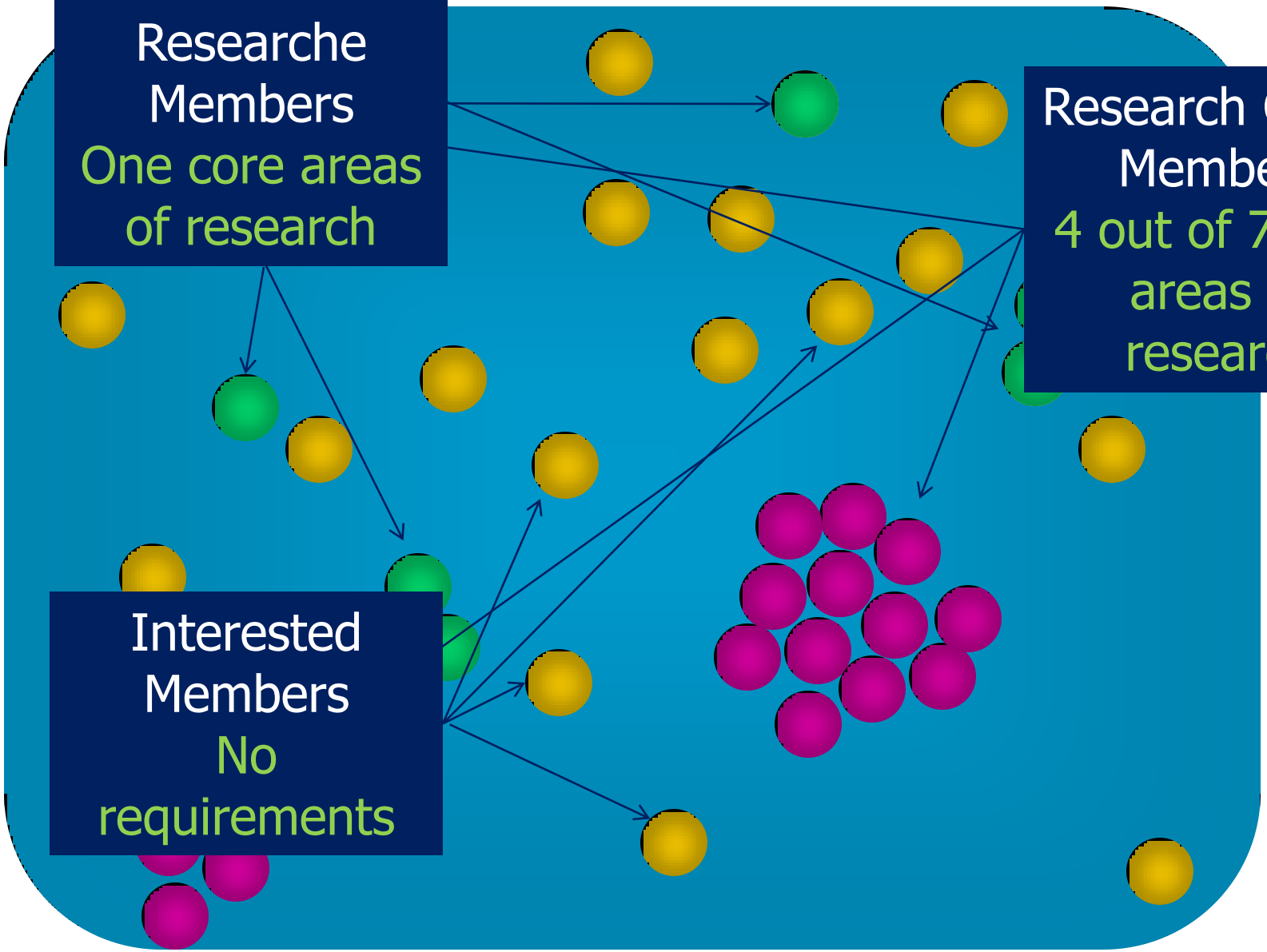
Creation process of the Mex-LTER Network



de la MEX-LTER



M e x – L T E R


Individual Researche Members
One core areas of research
Research Group Members
4 out of 7 core areas of research
Interested Members
No requirements

Core Areas of Research

What a 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?

Topic areas of monitoring....

- Climate
- Soil Characteristics
- Input/output Fluxes
- Diversity Per Unit Area
- Abundance of Key Populations
- Primary Productivity
- Land Use

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 implement progressively according to the specific conditions and characteristics of the sites.**

Workshops are carried out to discuss and determine the specific variables, periodicity and methods of the survey of monitoring schemes.

Mex-LTER groups

		Research core areas							Monitoring					
	# Inv.	PP	Bgq	BD	Per	CC	Int	Mng	Cl	S/A	Fl	Div	PP	Use
1	14	x	x	x	x	x			1	B	B		B	
2	1													
3	1													
4	2													
5	28		x	x	x			x	B	1	1	3	2	2
6	25	x	x	x	x	x	x	x	2	2	2	2	3	2
7	7			x	x	x		x	1		2	3	B	
8	13	x		x	x	x			B	1	B	2	B	1
9	9		x	x	x		x		2		2	1		B
10	5	x	x	x		x			B	B	B	3	1	1

There are 150 researchers from more than 20 institutions invlved in the Mexican LTER Network

Red Mex-LTER

Bosque tropical perennifolio

Bosque tropical subcaducifolio

Bosque tropical caducifolio

que espinoso

rral xerófito

tizal

Bosque de pino

esófilo

ón acuática y subacuática

Type (levels) of research at the Mex-LTER Network

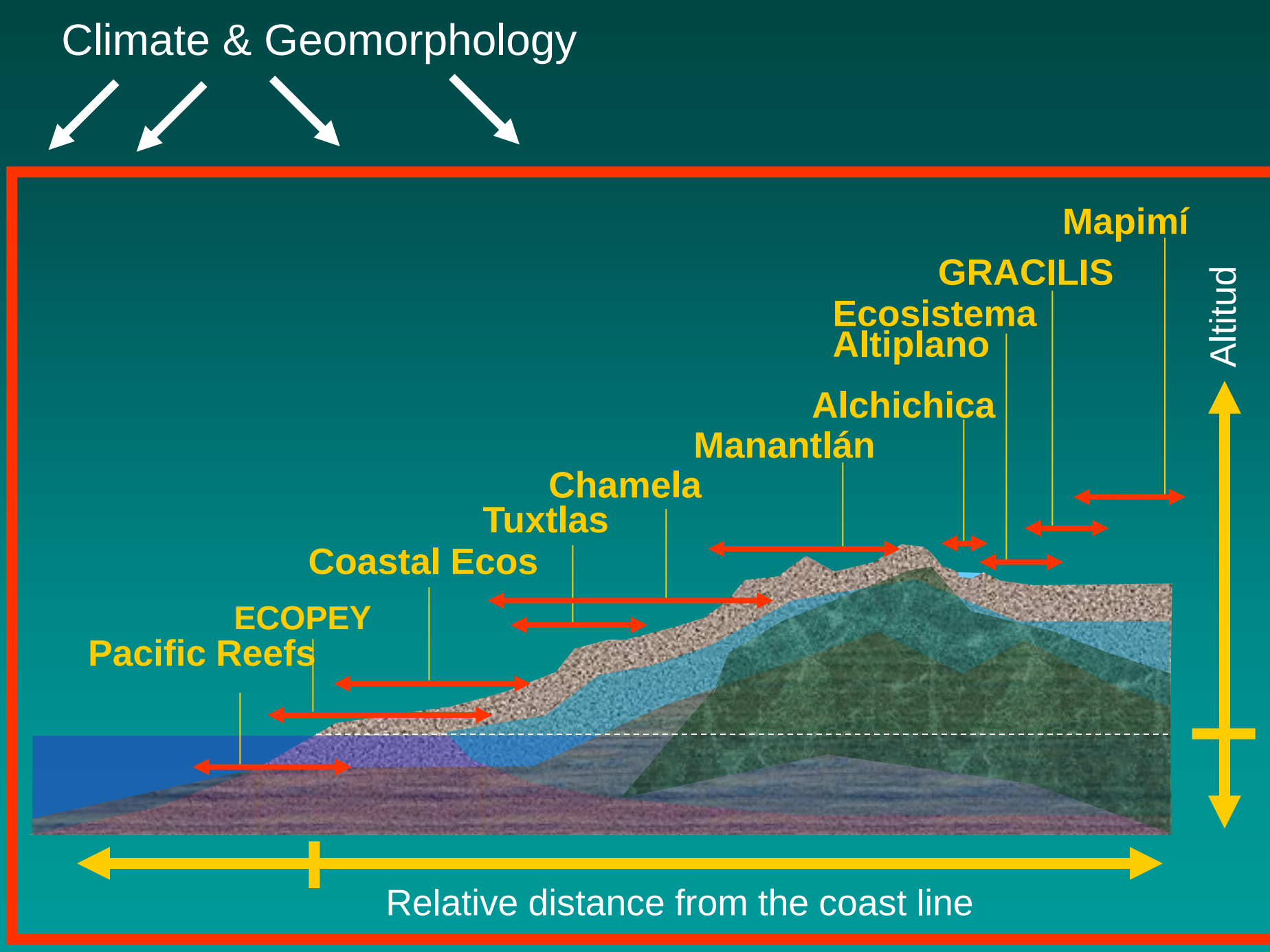
- Research agenda of each group (defined even before of joining to the network).
- Collaborative projects between groups (promoted at annual meetings).
- Strategic projects (all groups participation).
  - Eco-hydrology
  - Biodiversity
  - Information management and cyber-infrastructure

Hydrological Demands of Natural Ecosystems in México: Phase 1

a Mex-LTER strategic project

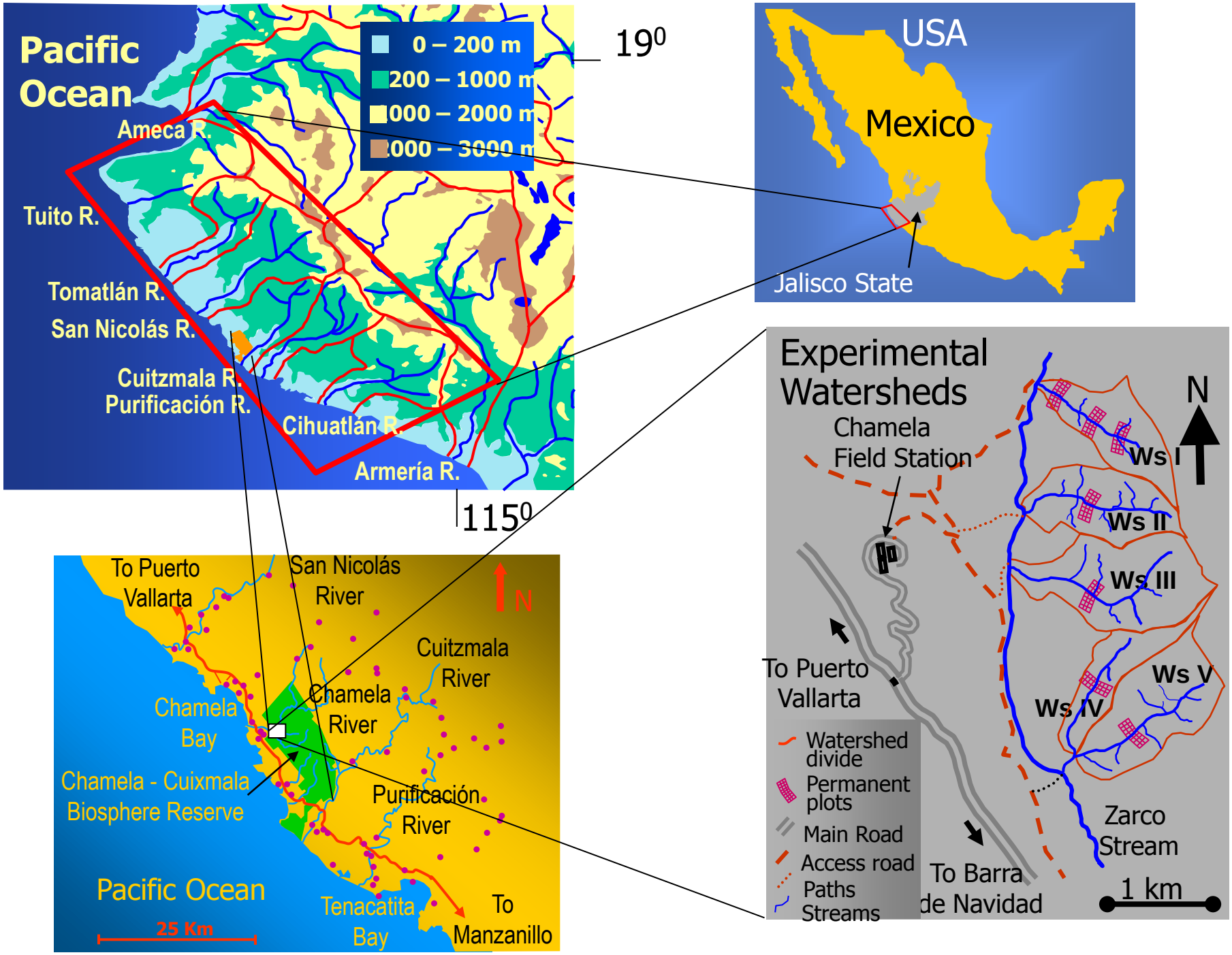
General objective (long term)

"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"


Climate & Geomorphology
Mapimí
GRACILIS
Ecosistema
Altiplano
Alchichica
Manantlán
Chamela
Tuxtlas
Coastal Ecos
ECOPEY
Pacific Reefs
Altitud
Relative distance from the coast line


Soil Fertility Maintenance
Fresh Water
Biotic Regulation

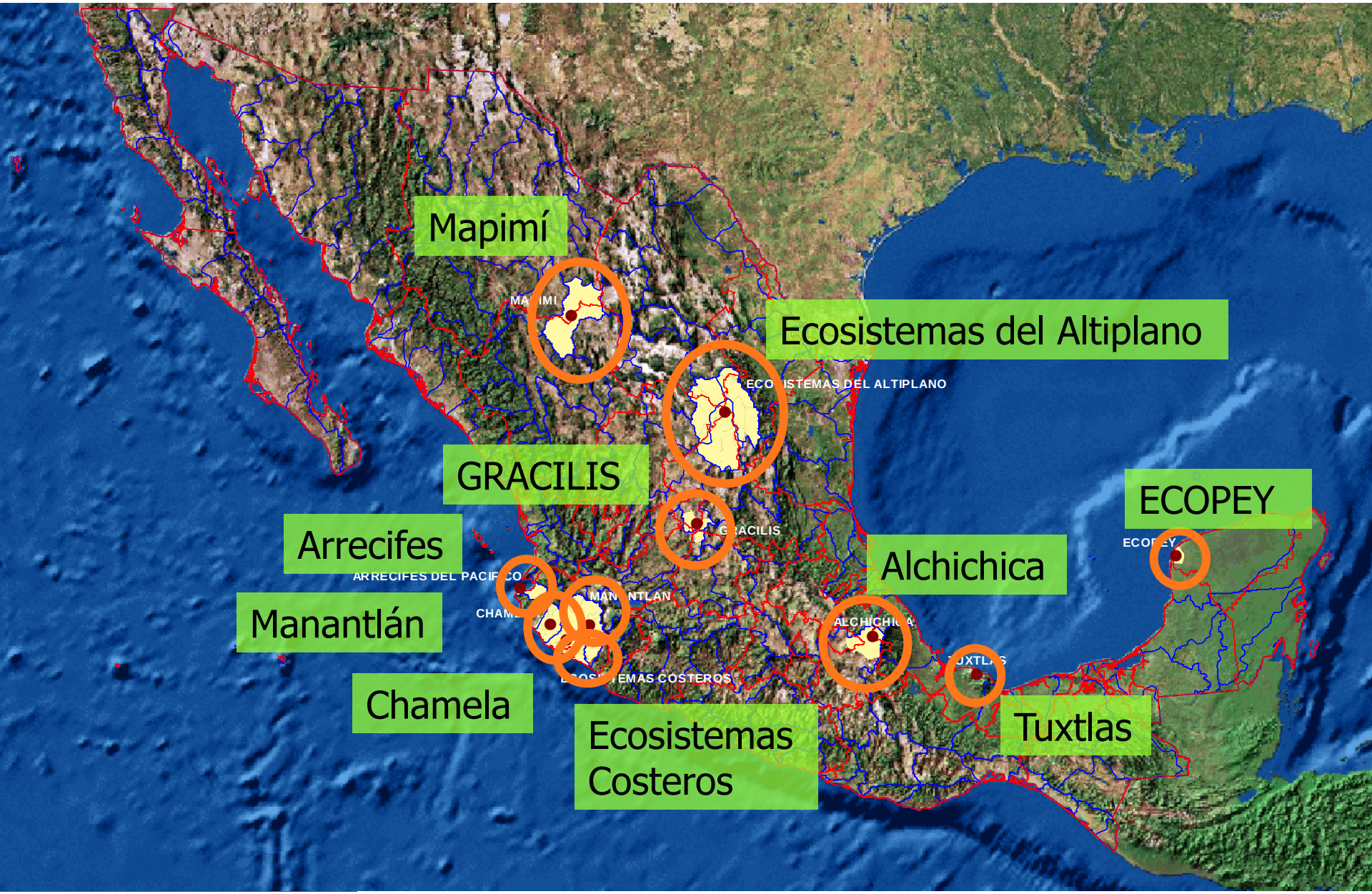
FIG.4

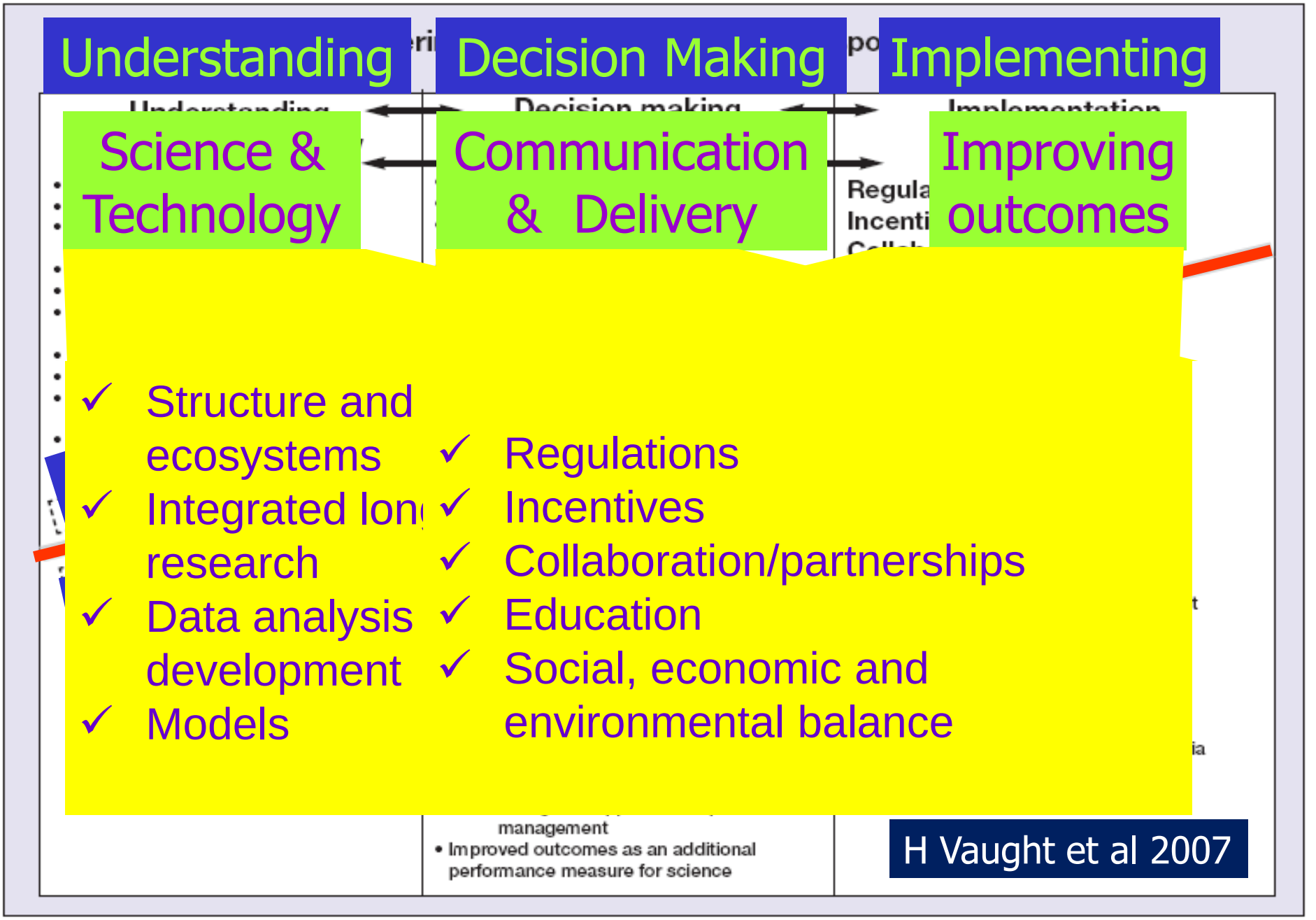

Pacific Ocean
0 – 200 m
200 – 1000 m
000 – 2000 m
000 – 3000 m
Ameca R.
Tuito R.
Tomatlán R.
San Nicolás R.
Cuitzmala R.
Purificación R.
Cihuatlán R.
Armería R.
19⁰
115⁰
USA
Mexico
Jalisco State
To Puerto Vallarta
San Nicolás River
N
Cuitzmala River
Chamela River
Chamela Bay
Chamela - Cuixmala Biosphere Reserve
Purificación River
Pacific Ocean
25 Km
Tenacatita Bay
To Manzanillo
Experimental Watersheds
Chamela Field Station
N
Ws I
Ws II
Ws III
Ws IV
Ws V
To Puerto Vallarta
Watershed divide
Permanent plots
Main Road
Access road
Paths
Streams
Zarco Stream
To Barra de Navidad
1 km

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

RED MEX-LTER
CUENCAS Y SUBCUENCAS




Understanding
Decision Making
Implementing
Science & Technology
Communication & Delivery
Improving outcomes
✓ Structure and ecosystems
✓ Integrated lon research
✓ Data analysis development
✓ Models
✓ Regulations
✓ Incentives
✓ Collaboration/partnerships
✓ Education
✓ Social, economic and environmental balance
management
• Improved outcomes as an additional performance measure for science
H Vaught et al 2007

Socio ecological agenda

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

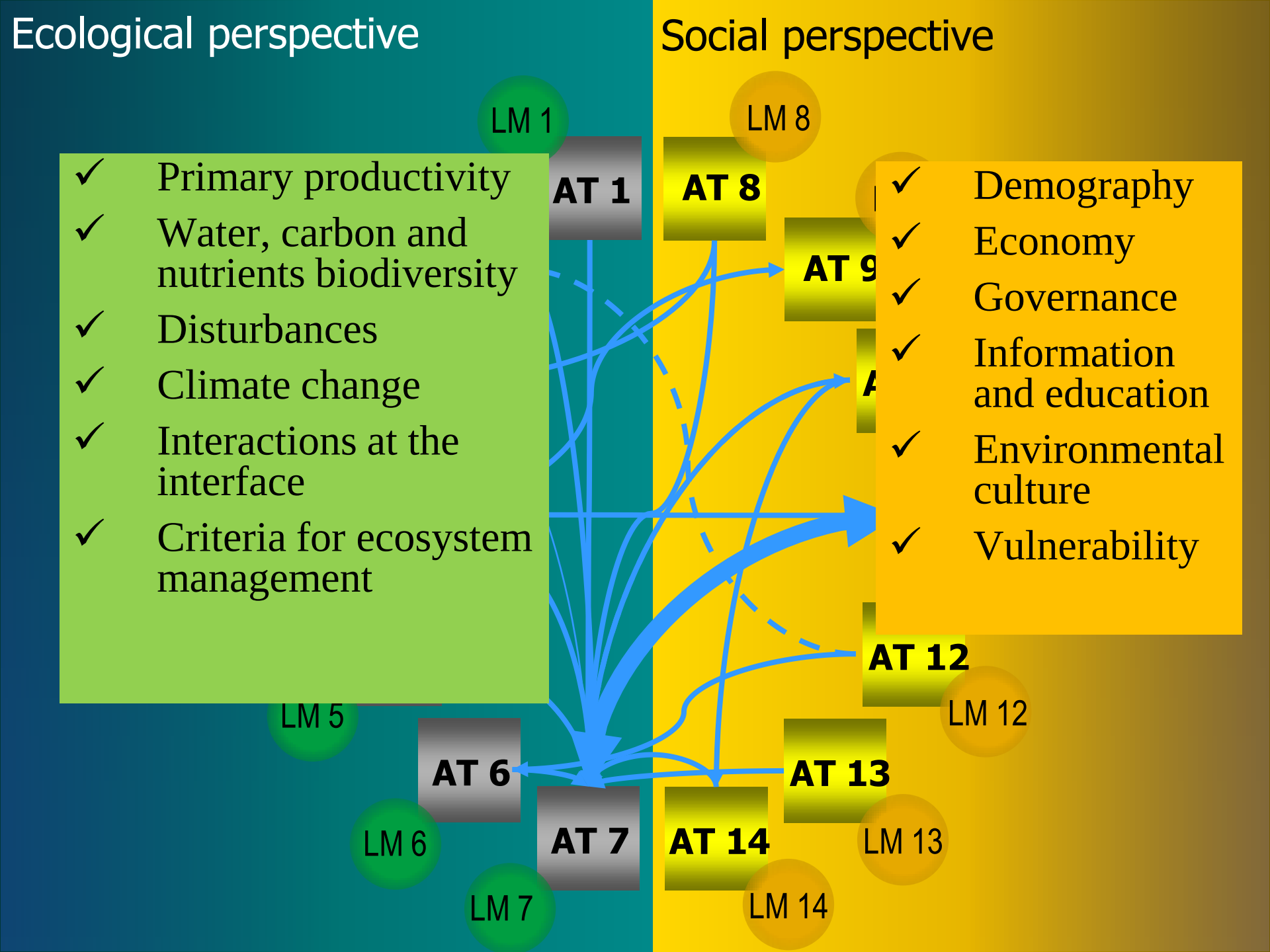
How are the economic valorization / relationships of ecosystem services?

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

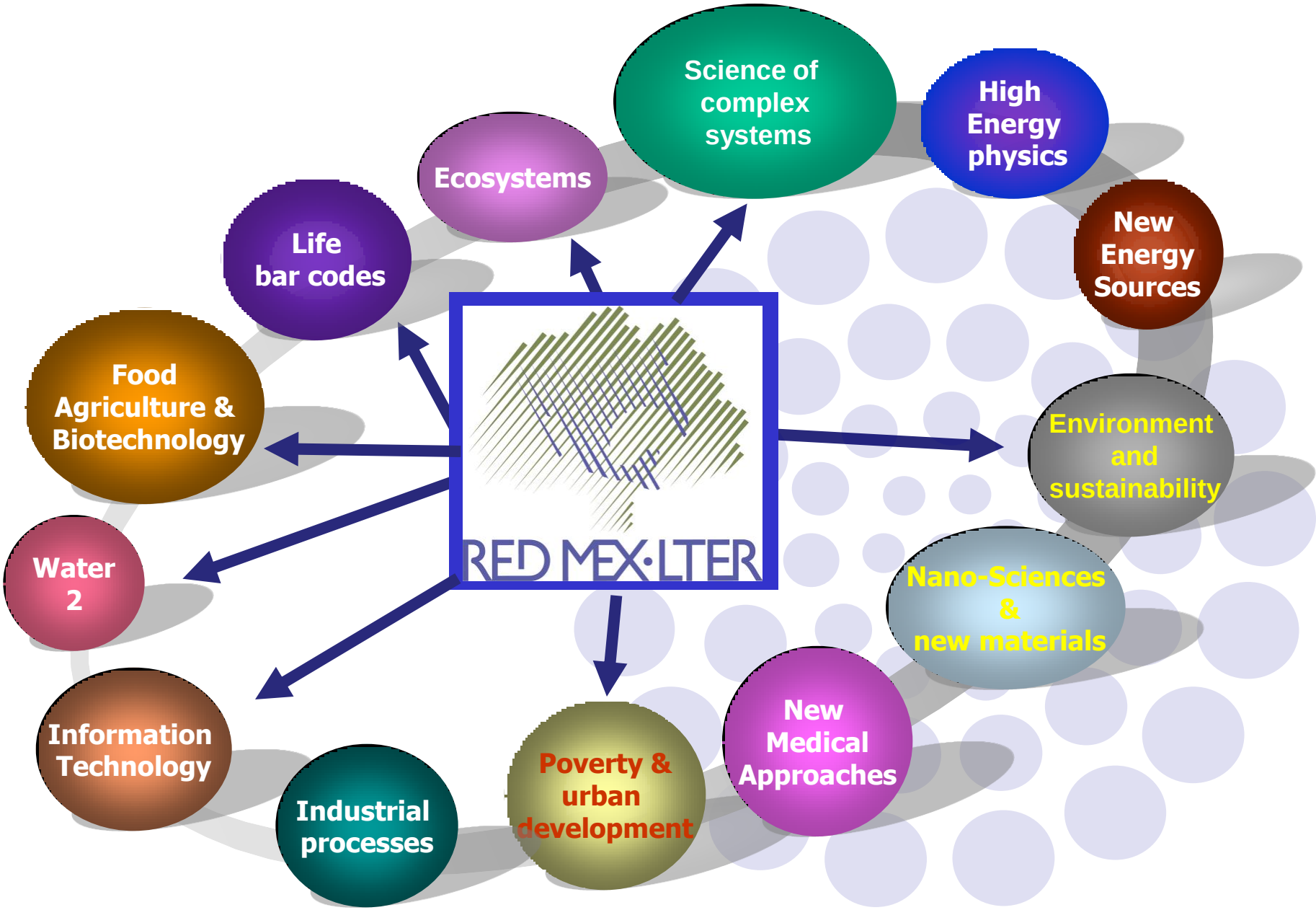
What is the roll of information and education (formal & non formal) in the socio-ecosystem management decisions?

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 ?


Ecological perspective
Social perspective
LM 1
LM 8
AT 1
AT 8
AT 9
AT 12
LM 12
LM 5
AT 6
AT 13
LM 6
AT 7
AT 14
LM 13
LM 7
LM 14
✓ Primary productivity
✓ Water, carbon and nutrients biodiversity
✓ Disturbances
✓ Climate change
✓ Interactions at the interface
✓ Criteria for ecosystem management
✓ Demography
✓ Economy
✓ Governance
✓ Information and education
✓ Environmental culture
✓ Vulnerability

CONACYT Thematic Networks




Gracias
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