# WATER MANAGEMENT IN URUGUAY: STRENGHTS AND WEAKNESS

SARA(S)² South American Institute for Resilience and Sustainability Studies

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- Water management in Uruguay: government structure

- Interactions among science, policy makers and stakeholders

- Innovation, adaptability and transformability

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# BASES PARA ESTABLECER UN PLAN DE MONITOREO NACIONAL DE RECURSOS HÍDRICOS

MESA DE RECURSOS HÍDRICOS/ UDELAR
CONVENIO MVOTMA/DINASA- UDELAR
2007

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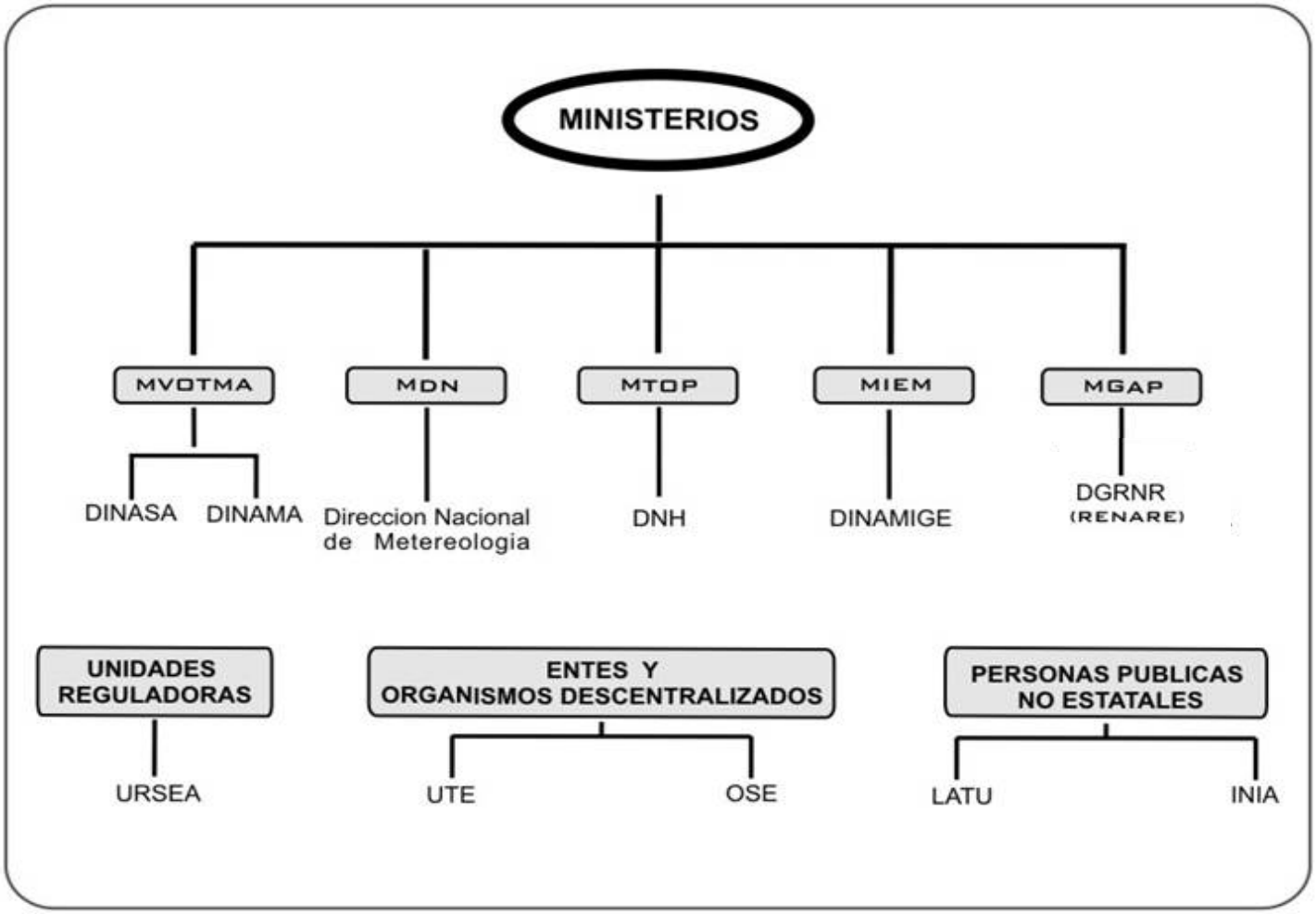
1.1 _ RIO CUAREIM
1.2 _ RIO ARAPEY GDE
1.3 _ RIO DAYMAN
1 _ RIO URUGUAY
1.4 _ RIO QUEGUAY GDE
2.1 _ RIO TACUAREMBÓ
2 _ RIO NEGRO
2.2 _ ALTO RIO NEGRO
2.3 _ MEDIO RIO NEGRO
2.5 _ BAJO RIO NEGRO
2.4 _ RIO YI
7.1 _ RIO YAGUARON
7.2 _ RIO TACUARI
7 _ LAGUNA MERIN
7.3 _ RIO OLIMAR GDE.
3.1 _ RIO SAN SALVADOR
4.1 _ RIO SAN JOSE
4.2 _ RIO SANTA LUCIA CH.
7.4 _ RIO CEBOLLATI
3 _ PLATENSE OCCIDENTAL
4 _ RIO SANTA LUCIA
3.2 _ RIO SAN JUAN
4.3 _ RIO SANTA LUCIA
3.3 _ RIO ROSARIO
6.1 _ PLATENSE ORIENTAL
6 _ ATLÁNTICA
6.2 _ ATLÁNTICA
5.1 _ METROPOLITANA
5 _ METROPOLITANA




*Government network structure and functioning*

• Uruguay has a several institutions (mainly at national level) involved in water management and policy.

• The network has few formal protocols and mechanisms of interaction, and the relationships depend (principally) of the goodwill and the particular interests of the actors (gubernamental agencies).

• This barrier is even stronger between the regional (local councils) and the national level interactions.

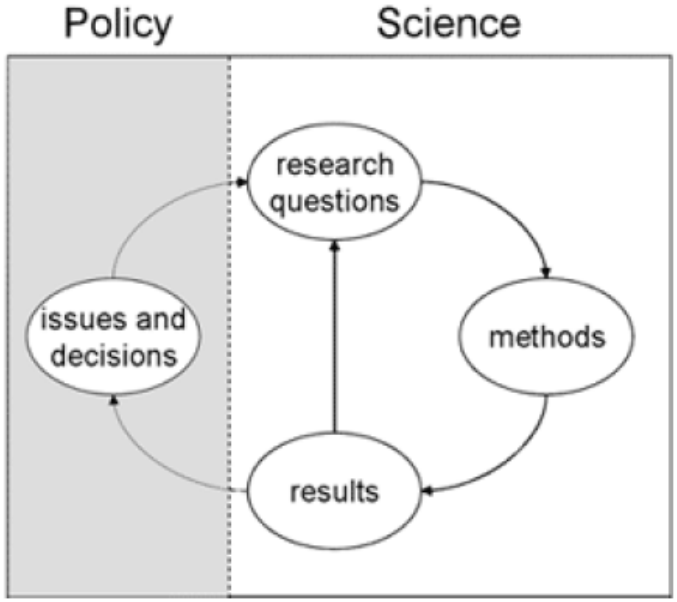
•The network includes a small amount of people, any social inconvenience or problem negatively impacts the interactions among the agencies.

• Most of the time, during the coalition governments, the political distribution (between the traditional parties) of the agencies and ministers, was considered the main factor (i.e, political differences) that limited and avoided effective interactions.

• The last two periods (the left government), demonstrated that the differences of objectives, goals, interests and focus among the actors are the most relevant factor.

• A recent study of the operating network by the UdelaR, revealed that all the actors emphasized the absence of a nationwide and coordinated policy of water management and use.

• However, there is no consensus about the role (and particularly, the coordination) of each actor.



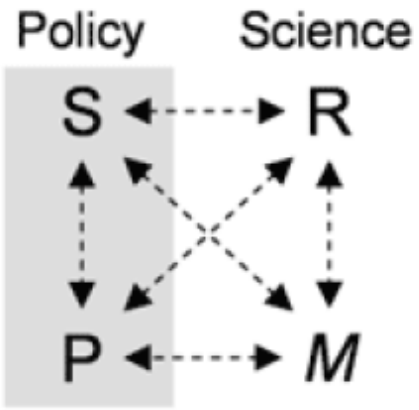

*Interactions among science, policy makers and stakeholders*

Barreteau, O., P. W. G. Bots, and K. A. Daniell. 2010. A framework for clarifying "participation" in participatory research to prevent its rejection for the wrong reasons. *Ecology and Society* **15**(2): 1. [online] URL: http://www.ecologyandsociety.org/vol15/iss2/art1/


*Synthesis*, part of a Special Feature on Implementing Participatory Water Management: Recent Advances in Theory, Practice and Evaluation

# A Framework for Clarifying "Participation" in Participatory Research to Prevent its Rejection for the Wrong Reasons

*Olivier Barreteau*[1], *Pieter W. G. Bots*[2], and *Katherine A. Daniell*[3]




***Legend:***

S stakeholders
P policymakers
R researchers
*M* models

◄- - - -► information flow

*Interactions among science, policy makers and stakeholders*

**S (stakeholder)**: all people who are concerned in their daily life by the policy issue at hand

**P (policy maker)**: all people who make decisions concerning the policy issue at hand, regardless of the scale of the issue. Thus, a farmer might be a policy maker within his farm

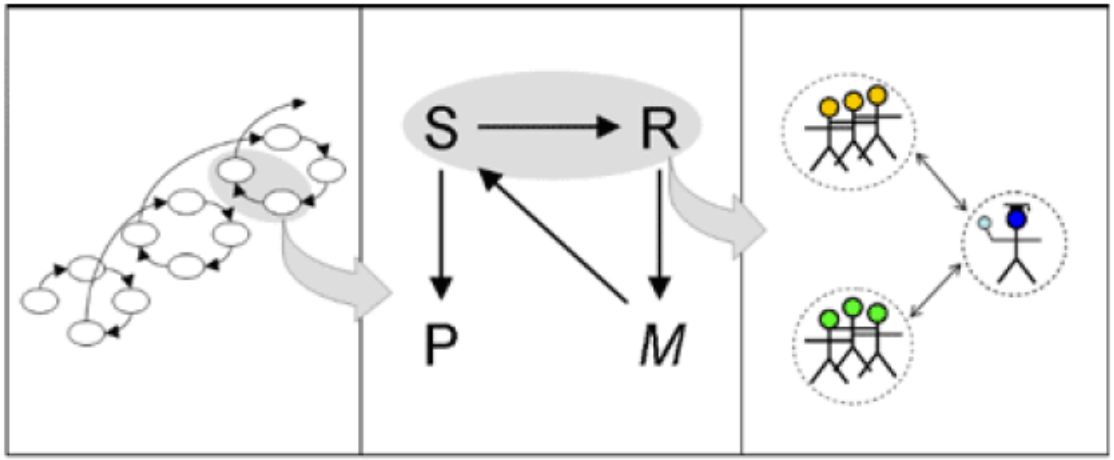
**R (researcher)**: all people who seek knowledge about the system using methods that meet the scientific standards of their discipline

**M (model)**: any kind of representation of the system that is investigated

**Table 1.** Different participation modes in research and innovation processes (adapted from Probst and Hagmann 2003).

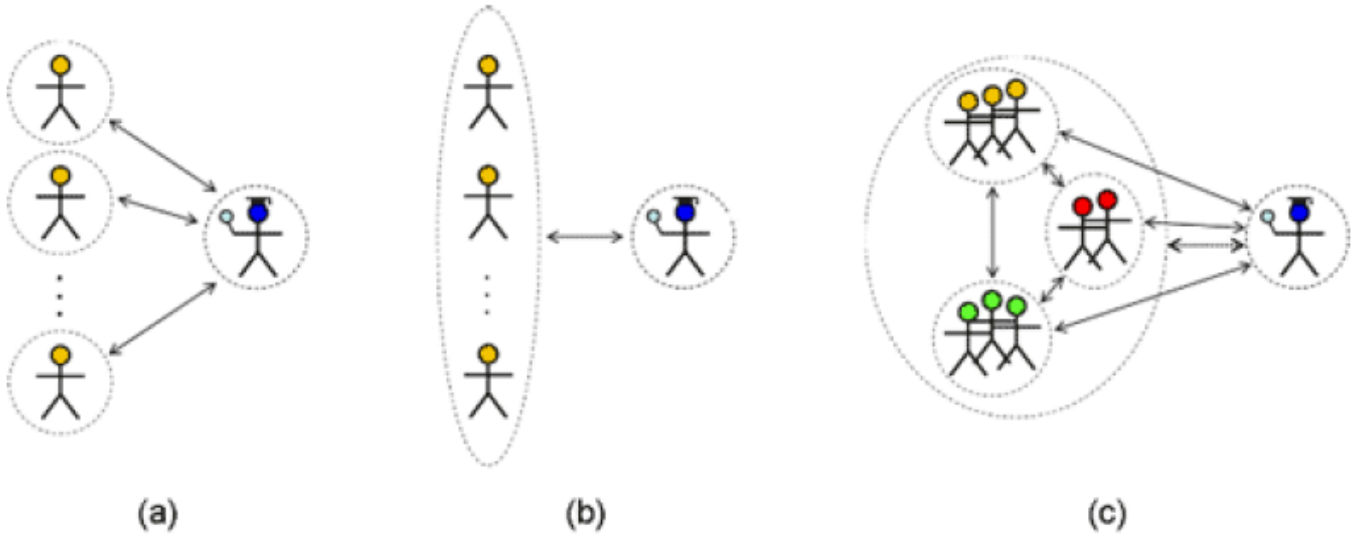
| Participation mode | Characteristics in terms of actor involvement and control over the process |
|---|---|
| Contractual | One actor has sole decision-making power over most of the decisions taken in the process, and can be considered the "owner" of this process. Other actors participate in activities defined by this "owner" by being (formally or informally) "contracted" to provide services and support. |
| Consultative | Most of the key decisions are kept with one actor, but emphasis is put on consultation and gathering information from other actors, especially for identifying constraints and opportunities, priority setting, and/or evaluation. |
| Collaborative | Different actors collaborate and are put on an equal footing, emphasizing links through an exchange of knowledge, different contributions, and a sharing of decision-making power during the process. |
| Collegiate | Different actors work together as colleagues or partners. "Ownership" and responsibility are equally distributed among the partners, and decisions are made by agreement or consensus among all actors. |

**Fig. 3.** Overview of the framework's three facets to explain a participatory research process.



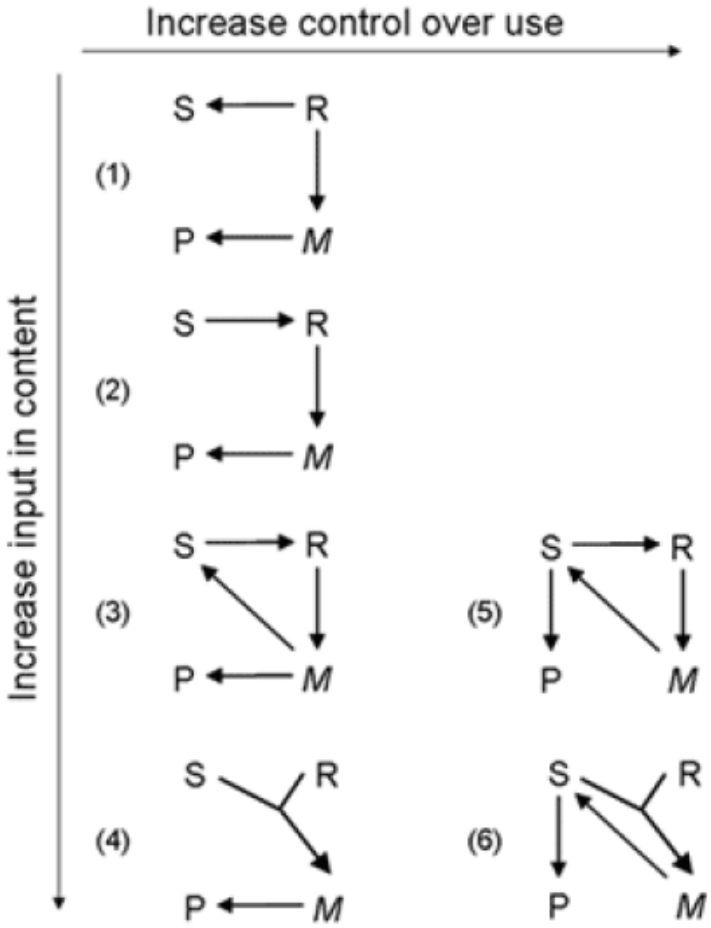

*Interactions among science, policy makers and stakeholders*

**Fig. 6.** Different ways of involving potentially heterogeneous actors in participatory research.



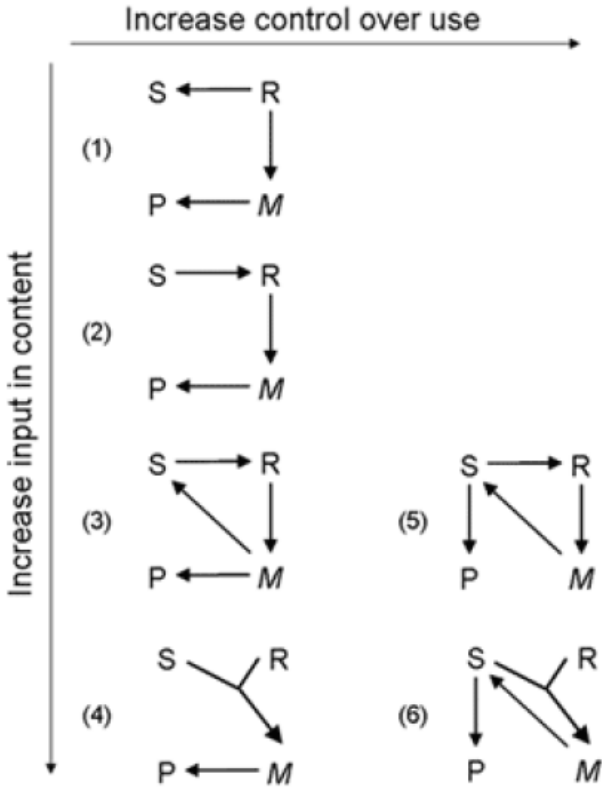

*Interactions among science, policy makers and stakeholders*

**Fig. 4.** Categories of participatory research process according to flows of information.




*Interactions among science, policy makers and stakeholders*

1. Information on research outcomes and no control over model use (The Przemska river catchment, Poland)
2. Consultation and no control over model use (The Guadiana basin, Portugal)
3. Dialog with researchers and no control over model use (The Tisza basin, between Hungary and the Ukraine)
4. Co-building of a model and no control over model use (Orange river basin, South Africa, Lesotho, Namibia and Botswana)
5. Dialog with researchers and control over model use (the Vecht catchment, the Netherlands)
6. Co-building of a model and control over model use (the Tadla irrigation scheme, Morocco)



Review TRENDS in Ecology and Evolution Vol.21 No.6 June 2006



# Ecology for transformation

**Stephen R. Carpenter[1] and Carl Folke[2]**

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[2]Center for Transdisciplinary Environmental Research and Department of Systems Ecology, Stockholm University, SE-10691, Stockholm, Sweden

Because the relationship between ecosystems and societies changing continuously, it is difficult to predict the consequences of management actions; therefore, it is misleading to view ecosystem management (possible model) as the solution to a problem.

Instead, **management actions should be viewed as experiments that can improve knowledge of social-ecological dynamics if the outcome is monitored and appropriately analyzed.**


**LOCAL LEVEL**

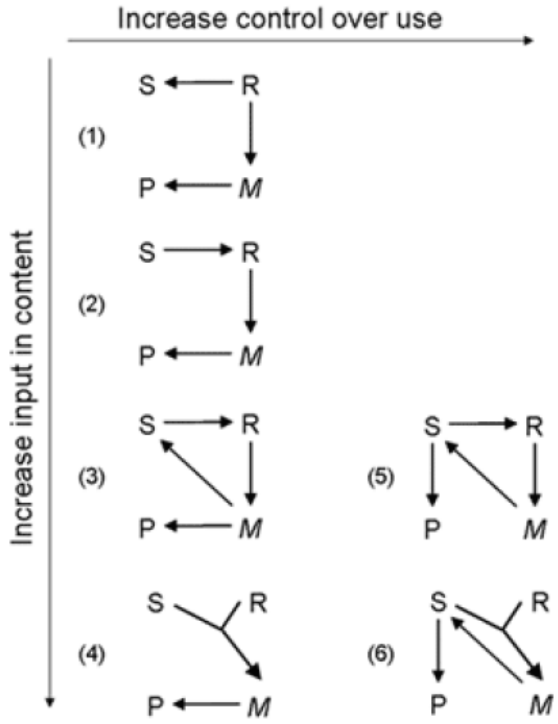
Eutrophication processes with different adverse consequences according with the stakeholders perspectives:

• Laguna del Sauce: interferences with the drinking water supply

• Laguna del Diario: landscape or aesthetic interferences by submerged plants biomass accumulation on the surface

• Laguna Blanca: interferences with the drinking water supply

1. Information on research outcomes and no control over model use (Laguna Blanca)
2. Consultation and no control over model use (Laguna Blanca)
3. Dialog with researchers and no control over model use
4. Co-building of a model and no control over model use (Laguna del Sauce)
5. Dialog with researchers and control over model use
6. Co-building of a model and control over model use (Laguna del Diario)

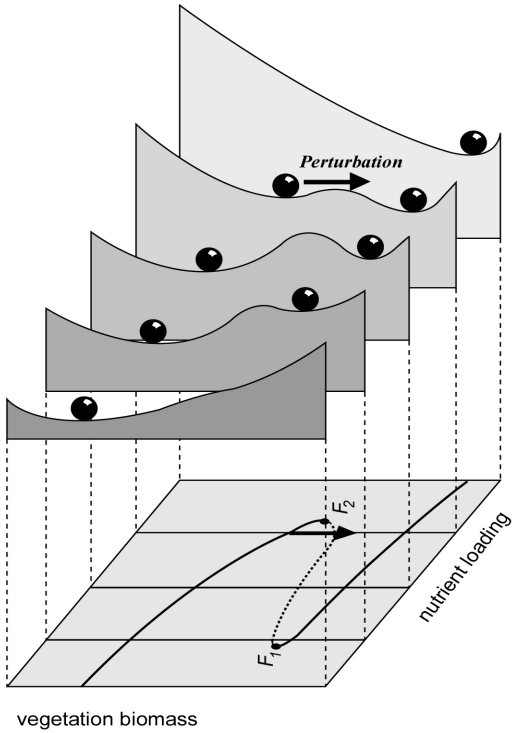


• In the same socio-economic scenario and with same water quality issues it is possible to observe different network configurations.

• The role of the stakeholders and the perceptions of the water problems determines different scheme of interactions.

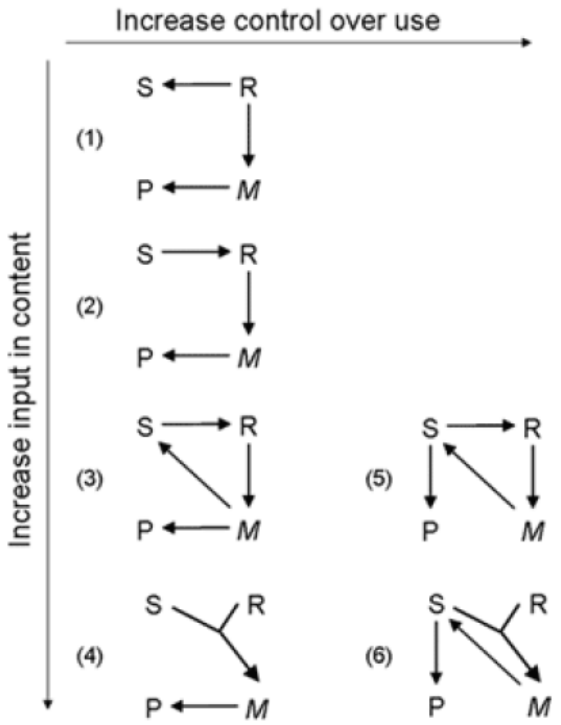
• The relevance of the water problems assigned by the stakeholders and the researchers could be quite different and determine the network structure.

• Critical transitions determine more complex networks with an increase of the model use control by the Science and more collaborative or collegiate participation.

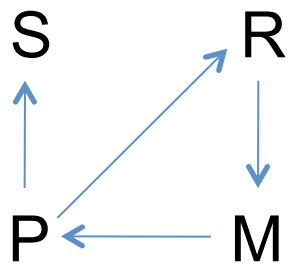



*Interactions among science, policy makers and stakeholders*

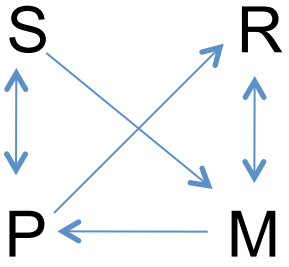
1. Information on research outcomes and no control over model use (Cuareim basin: irrigation)
2. Consultation and no control over model use (Cuareim basin: irrigation, Water quality monitoring of Río Uruguay)
3. Dialog with researchers and no control over model use
4. Co-building of a model and no control over model use (Flooding control and management, Water monitoring and management in Canelones)
5. Dialog with researchers and control over model use
6. Co-building of a model and control over model use (Environmental Hydro-meteorological lab)




NATIONAL LEVEL




**Water quality control of Río Santa Lucía**




**Eutrophication control of Laguna del Cisne (Canelones)**

**NATIONAL LEVEL**

•The network includes a small amount of people, any social inconvenience or problem negatively impacts the interactions among the agencies.

• A minor modification of the network (i.e. one member) can drastically modifies the interactions pattern.

• Generalistics members (i.e. two or more roles by the same person) increase the connectivity and the complexity of the network.

Gunderson, L. H., S. R. Carpenter, C. Folke, P. Olsson, and G. D. Peterson. 2006. Water RATs (resilience, adaptability, and transformability) in lake and wetland social-ecological systems. *Ecology and Society* **11** (1): 16. [online] URL:http://www.ecologyandsociety.org/vol11/iss1/art16/

*Insight*, part of a Special Feature on Exploring Resilience in Social-Ecological Systems

# Water RATs (Resilience, Adaptability, and Transformability) in Lake and Wetland Social-Ecological Systems

*Lance H. Gunderson*[1], *Steve R. Carpenter*[2], *Carl Folke*[3], *Per Olsson*[4], and *Garry Peterson*[5]

*Innovation, adaptability and transformability*

• **Novelty** and **innovation** are required for systems to remain dynamic and functioning.

• Without innovation and novelty, systems may become overconnected and dynamically locked, and the capital therein may be unavailable.

• Novelty and innovation are required to keep existing complex systems resilient and to create new structures and dynamics following system crashes.

# Texto de la Reforma Constitucional en Defensa del Agua

## ¿Qué reformamos en la Constitución?

"Derechos, deberes y garantías" (Medio Ambiente)

**Se propone modificar dos artículos de la Constitución y se ha adicionado una disposición transitoria. Pero vayamos por partes:**

### ARTÍCULO 47. (Agréguese):

El agua es un recurso natural esencial para la vida. El acceso al agua potable y el acceso al saneamiento, constituyen derechos humanos fundamentales.

1. La política nacional de Aguas y Saneamiento estará basada en:

a) el ordenamiento del territorio, conservación y protección del Medio Ambiente y la restauración de la naturaleza.

b) la gestión sustentable, solidaria con las generaciones futuras, de los recursos hídricos y la preservación del ciclo hidrológico que constituyen asuntos de interés general. Los usuarios y la sociedad civil, participarán en todas las instancias de planificación, gestión y control de recursos hídricos; estableciéndose las cuencas hidrográficas como unidades básicas.

c) el establecimiento de prioridades para el uso del agua por regiones, cuencas o partes de ellas, siendo la primera prioridad el abastecimiento de agua potable a poblaciones.

d) el principio por el cual la prestación del servicio de agua potable y saneamiento, deberá hacerse anteponiéndose las razones de orden social a las de orden económico.

Toda autorización, concesión o permiso que de cualquier manera vulnere estos principios deberá ser dejada sin efecto.

2. Las aguas superficiales, así como las subterráneas, con excepción de las pluviales, integradas en el ciclo hidrológico, constituyen un recurso unitario, subordinado al interés general, que forma parte del dominio público estatal, como dominio público hidráulico.

3. El servicio público de saneamiento y el servicio público de abastecimiento de agua para el consumo humano serán prestados exclusiva y directamente por personas jurídicas estatales.

4. La ley, por los tres quintos de votos del total de componentes de cada Cámara, podrá autorizar el suministro de agua, a otro país, cuando éste se encuentre desabastecido y por motivos de solidaridad.

## ARTÍCULO 188. (Agréguese):

Las disposiciones de este artículo (referidas a las asociaciones de economía mixta) no serán aplicables a los servicios esenciales de agua potable y saneamiento.

## Disposiciones Transitorias y Especiales (Agréguese la siguiente):

Z") La reparación que correspondiere, por la entrada en vigencia de ésta reforma, no generará indemnización por lucro cesante, reembolsándose únicamente las inversiones no amortizadas.

**Comisión Nacional en Defensa**
**del Agua y de la Vida**


The policy dimension shows important and recently innovations (promoted by ONG and government) like:

- Decentralization of land planning
- Drainage basin as unit of analysis and management
- The relevance of drinking water supply in the hierarchy system of the ecosystems services

**Adaptability** is the capacity of the social components in a system to manage ecological resilience

Human actions influence resilience, either intentionally or unintentionally, and can focus on maintaining a system within a desired regime that provides necessary ecosystem goods and services or restoring the system from an undesirable regime into a desired one

**Transformability** is the capacity to create a fundamentally new system configuration.

Socialecological systems can be transformed in response to the recognition of the failure of past policies and actions, signaled by a resource crisis or driven by shifts in social values.

Four components are crucial for the adaptability and transformational change:

- Open and flexible epistemic networks
- Different strategies of learning
- All the actors need an adequate space to meet and foster learning
- Fostering of trust through leadership

| COMPONENTS | LAGUNA BLANCA | LAGUNA DEL SAUCE | LAGUNA DEL DIARIO |
|---|---|---|---|
| Open and flexible epistemic networks | | + | + |
| Different strategies of learning | | | + |
| All the actors need an adequate space to meet and foster learning | | | + |
| Fostering of trust through leadership | | | + |

However, essential concepts are missing in several examples of Uruguayan water management:

- Resilience
- Critical transitions
- Threshold
- Adaptative management
- Adaptative governance
- Panarchy

Gunderson, L. H., S. R. Carpenter, C. Folke, P. Olsson, and G. D. Peterson. 2006. Water RATs (resilience, adaptability, and transformability) in lake and wetland social-ecological systems. *Ecology and Society* **11** (1): 16. [online] URL:http://www.ecologyandsociety.org/vol11/iss1/art16/


*Insight*, part of a Special Feature on Exploring Resilience in Social-Ecological Systems

# Water RATs (Resilience, Adaptability, and Transformability) in Lake and Wetland Social-Ecological Systems

*Lance H. Gunderson*[1], *Steve R. Carpenter*[2], *Carl Folke*[3], *Per Olsson*[4], and *Garry Peterson*[5]

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The learning process will be the key.

To learn and innovate, systems must be open and tolerant of failure. Every failure is full of learning successes.

Nunca podremos saber todo, pero no podemos desconocer lo que ignoramos…….

# Sustentabilidad y resiliencia de sistemas humanos y naturales acoplados

UNIVERSIDAD DE LA REPÚBLICA
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# Estado trófico de Laguna del Sauce y respuestas asociadas

*Néstor Mazzeo, Felipe García-Rodríguez, Adriana Rodríguez, Gustavo Méndez, Carlos Iglesias, Hugo Inda, Guillermo Goyenola, Soledad García, Claudia Fosalba, Soledad Marroni, Carolina Crisci, Laura del Puerto, Juan Clemente, Juan Pablo Pacheco, Carmela Carballo, Alejandra Kroger, Mariana Vianna, Mariana Meerhoff, Manfred Steffen, Juan José Lagomarsino, Malvina Masdeu, Nicolás Vidal, Franco Teixeira de Mello, Iván González Bergosoni & Diego Larrea.*

**Resumen**

La información analizada en el presente capítulo permite afirmar que Laguna del Sauce es un sistema eutrófico, que se encuentra en un proceso acelerado de enriquecimiento de nutrientes a partir de los últimos 100 años. La construcción de la presa contribuyó sustancialmente a la aceleración del proceso. Las respuestas del sistema al fenómeno de eutrofización son de dos tipos: floraciones microalgales o de cianobacterias y crecimiento excesivo de plantas sumergidas. Las floraciones fitoplanctónicas presentan variaciones espaciales y temporales importantes que no pueden ser explicadas exclusivamente en función de la disponibilidad de nutrientes y temperatura, la disponibilidad de otros recursos (luz), la baja presión de consumo o herbivoría condicionada por la estructura del zooplancton, y la variabilidad climática son factores claves en este proceso. La baja presión de herbivoría sobre el fitoplancton obedece a varios factores, la presión de pesca artesanal sobre los predadores topes (peces piscívoros) es uno de los más relevantes. Finalmente, la respuesta a la eutrofización en sectores del reservorio como Laguna del Potrero se relaciona con un crecimiento desmedido de plantas sumergidas que interfiere con usos como la navegación o la recreación.

*Bases técnicas para el manejo integrado de Laguna del Sauce y cuenca asociada. Steffen M. & Inda H. (eds). XX-XX*