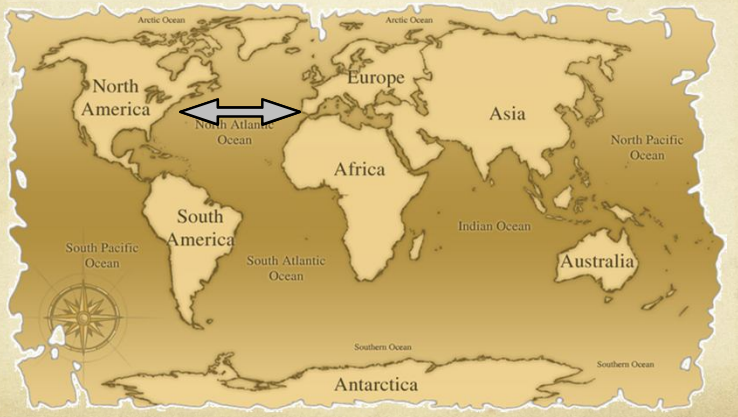
Participatory Knowledge Generation for Decision Making:

International Conference On Data, Information And Knowledge For Water Governance In The Networked Society (9-11th June 2014, University of Seville, Seville, Spain)

Hoshin V Gupta & Aleix Serrat-Capdevila

With *– Francina Dominguez, Xubin Zeng, Juan Valdes, Franck Poupeau, & Graciela Schneier-Madanes*

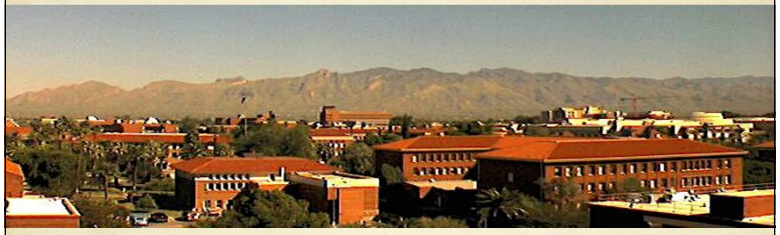
What is Swan ?



Major Goals

1. *Enhance scientific cooperation between USA & Europe.*
2. *Promote Multi-Disciplinary and Multi-Regional collaboration regarding Water Sustainability.*
3. *Combine Physical & Social Sciences, with Governance perspectives.*
4. *Develop a foundation for future collaboration.*

Origins

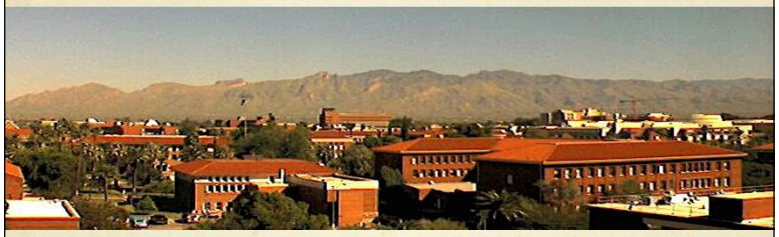


Arose out of conversation between ***UofA*** and ***UMI*** scientists

→ *successes and failures* of the 10-year "***SAHRA***" *Science & Technology Center* project funded by NSF

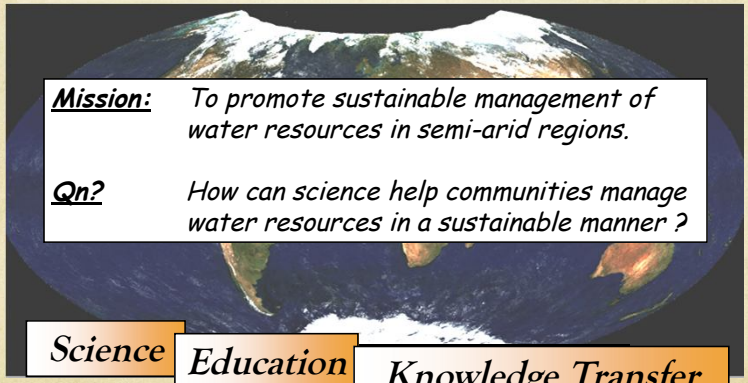
SAHRA

was a Very Successful Working Partnership



1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

MISSION



Mission: *To promote sustainable management of water resources in semi-arid regions.*

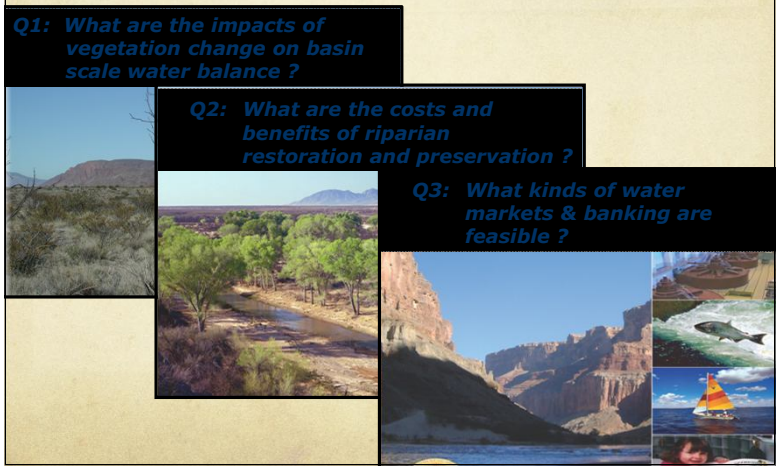
Qn? *How can science help communities manage water resources in a sustainable manner ?*

Science *Education* *Knowledge Transfer*

SAHRA

More than 523 Participants
Including 222 Grad and 94 Undergrad Students
100+ projects

Focused on Three "Stakeholder Relevant"
"Integrating Science Questions"



SAHRA Goals

SAHRA's science and research goal is to develop new and improved multidisciplinary understanding of semiarid hydrology.

SAHRA's stakeholder engagement and outreach goals are to

(a) enhance stakeholder/scientist dialog and develop mechanisms to support stakeholders in their decision-making; and

(b) disseminate and transfer SAHRA-relevant knowledge to scientists, water professionals, elected officials, and the public.

SAHRA's education goal is improving the multidisciplinary hydrologic literacy of the general public and within the educational system.

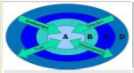
The Participatory Processes

The Upper San Pedro	The Middle Rio Grande

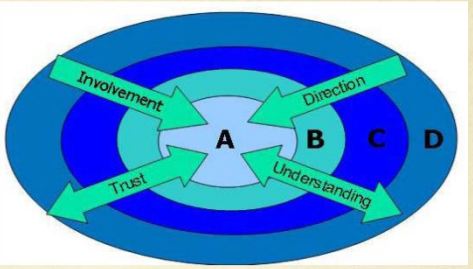
Drivers of the Processes

	Upper San Pedro	Middle Rio Grande
Drivers of Collabor. Process and Modeling	Protected Riparian Area → Law Suits threatening the economic motor of the basin (Fort Huachuca, through BRAC) → Congress Mandate to attain sustainable yield by 2011	State-wide Planning Process (Middle Rio Grande Planning Region)

Process Structure Comparison

Circle of Influence	Upper San Pedro	Middle Rio Grande
	*Upper San Pedro Partnership*	*Middle Rio Grande Water Assembly*
A: Modelers	The University of Arizona Modeling Team	Sandia National Labs
B: Experts, Advisors	Technical Committee of the USPP	Cooperative Modeling Group
C: The public	open to the public	open to the public
D: Decision Makers	Partnership Advisory Commission & Executive Committee	Middle Rio Grande Council of Governments

Shared Vision Planning



Circle A: Core planners and model developers.
Circle B: Stakeholder representatives and technical experts.
Circle C: The general public.
Circle D: The decision makers.

Figure from Cardwell et al. (2009): The Circles of Influence in SVP

Process Structure Comparison

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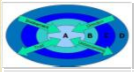	*Upper San Pedro Partnership*	*Middle Rio Grande Water Assembly*
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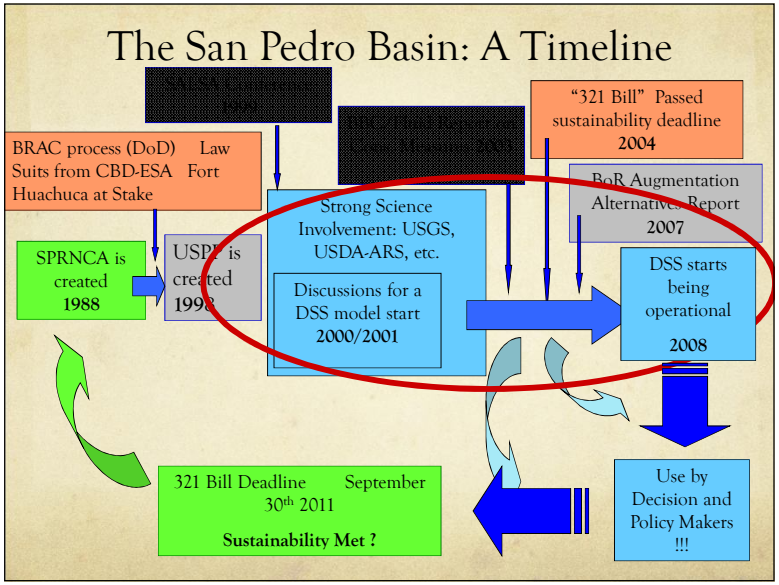
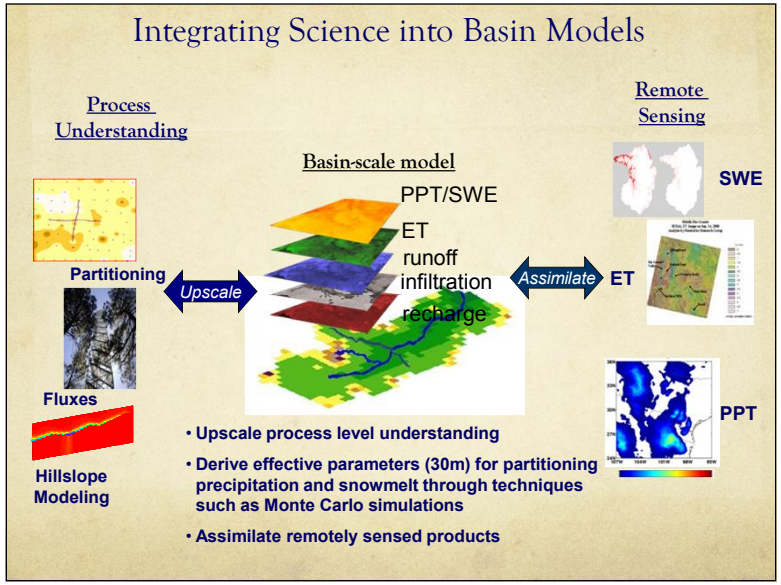
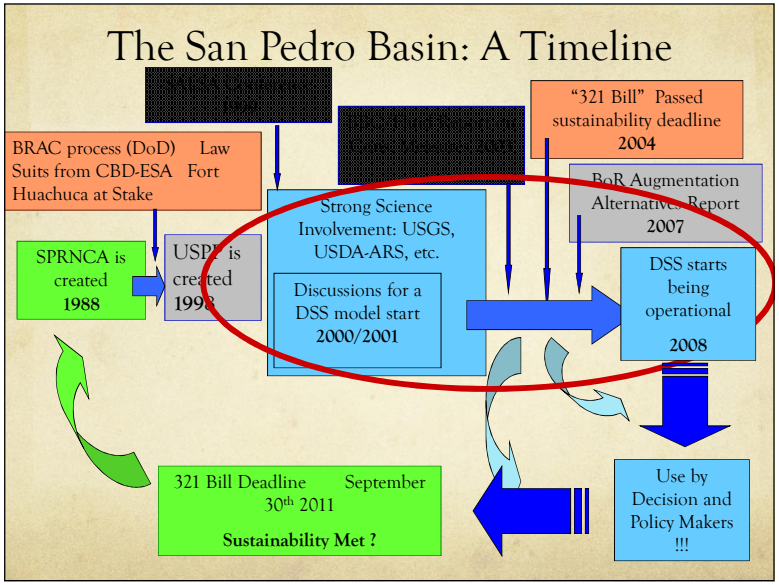
The Upper San Pedro Partnership

http://www.usppartnership.com/press_mission.htm


The San Pedro Basin: A Timeline
BRAC process (DoD) Law Suits from CBD-ESA Fort Huachuca at Stake
"321 Bill" Passed sustainability deadline 2004
BoR Augmentation Alternatives Report 2007
Strong Science Involvement: USGS, USDA-ARS, etc.
SPRNCA is created 1988
USFS is created 1993
Discussions for a DSS model start 2000/2001
DSS starts being operational 2008
321 Bill Deadline September 30th 2011
Sustainability Met ?
Use by Decision and Policy Makers !!!


Integrating Science into Basin Models
Process Understanding
Remote Sensing
Basin-scale model
PPT/SWE
ET
runoff
infiltration
recharge
Partitioning
Upscale
Assimilate
ET
SWE
PPT
Fluxes
Hillslope Modeling
• Upscale process level understanding
• Derive effective parameters (30m) for partitioning precipitation and snowmelt through techniques such as Monte Carlo simulations
• Assimilate remotely sensed products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(as reported by the Stakeholders)

Communication

- The development of the DSS focused discussions on particular topics.
- Definition of sets of conservation measures, and their overlaps.
- Collaborative process:

  every decision ⟷ iterative communication
- Have ongoing discussions on different issues simultaneously is a continuous *"opportunity to ask questions, focused questions, the good questions"*
- Focused and Itemized communication → key to common understanding.

Understanding

The Physical System

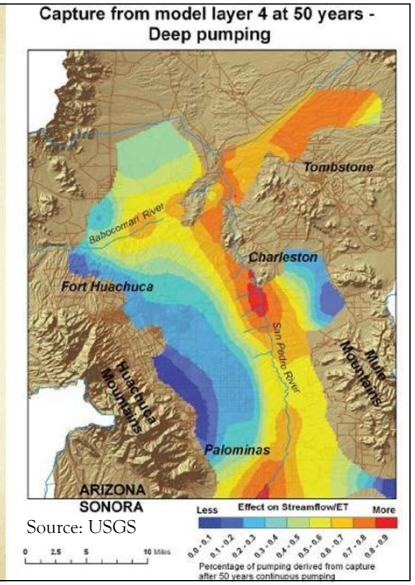
- Greatly Improved understanding of the physical system:
  - thanks to DSS + GW modeling + others
- Spatial dimension of the problem
- Understanding of models themselves

Each Other

- Each other's language and jargon
- Drivers and constraints of each stakeholder:
  - *"what drives each one's decision-making"*
  - *"I understand now the challenges of legislation"*
- Measures: what is politically feasible, legally possible and economically viable.

Understanding

- Spatial dimension of the problem
  - Capture Map (USGS)



Source: USGS

Influence on Policy Making

The science processes within the partnership have <u>influenced</u> policy in two issues (although the USPP has no power to impose policies or regulations):

1. Cochise County (SV subwatershed): development density limits imposed within two miles of the river.
2. Transfer of development rights in areas far away from the riparian corridor.

Other Outcomes

1. Some stakeholders reduced their water use significantly, by their own initiative
   Fort Huachuca the best example.

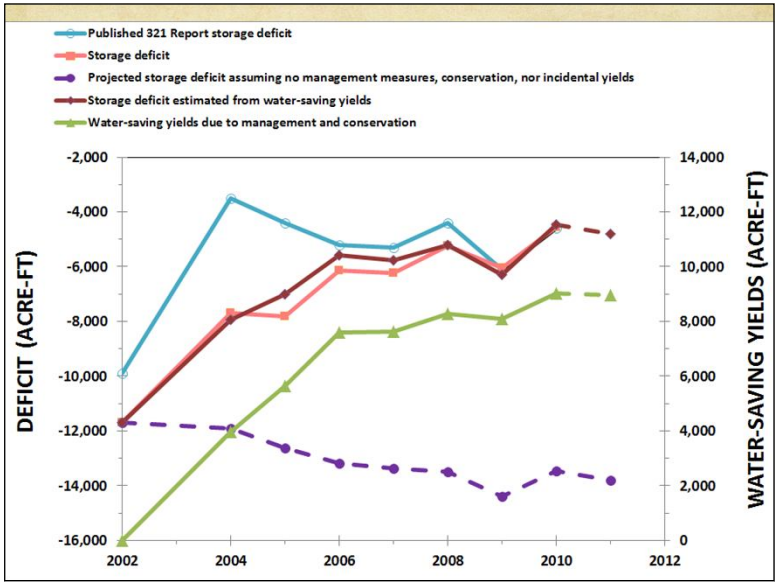
2. Retirement of farmland
   (which used groundwater to irrigate).

3. Waste-water reuse and recharge into the aquifer

Latest Update from the San Pedro Basin

- **GW Deficit:**
  - 14-15,000 af/y **without** Conservation Measures
  - **6,000 af/y with** Conservation Measures

- **Sustainability Deadline was NOT met** (Bill321, Sept 2011)
  - No consequences stated in the Bill.



Key Contributions of the Process

1. Allowing more focused discussions on particular issues simultaneously
2. A shared understanding of the system, both physical and human
3. Joint acknowledgement of what is NOT reasonable or convenient
4. Builds **TRUST** and **OWNERSHIP** :
   - *"The DSS is not seen as a black box, everybody's concerns went into it"*
   - *"The DSS project has been like a micro-cosmos for consensus building"*
5. Engaging stakeholders and managers before decisions are taken:
   Understanding → Actions & Behavior Change

What would they do different ?

1. Try to do it faster (acknowledged it's a slow process)
2. Better management of expectations
3. More clear chain of responsibility:
   - More expeditive (less chance of catching up on particip.)
   - Modelers reporting back to one person
   - Reduce need of Tech Committee to check back with broader USPP
   - Still with academia, but with a business contract, tied into a budget and deadlines
4. Allow for less participation:
   - Some democratic process but not all of it, it takes forever
5. More outreach and public input:
   - A more aggressive approach to bringing the understanding of the model to all involved stakeholders and the public: for TRUST
6. Show examples beforehand:
   - Initially not a clear idea of where the DSS would lead us
   - Define its purpose, how it would be used and limitations
   - Perhaps provide a short written document (vs only oral explanations)
   - "The Partnership didn't know what they wanted until they saw what Kevin had"
7. **Involve policy people from the beginning:**
   - No "call me when you're finished" policy
   - "They should have been more involved"
8. Change NOTHING:
   - "The DSS was like creating something that had never been done. A really good process"

Stakeholder Relevant "Integrating Science Questions"

Q1: What are the impacts of vegetation change on basin scale water balance ?

Q2: What are the costs and benefits of riparian restoration and preservation ?

Q3: What kinds of water markets & banking are feasible ?

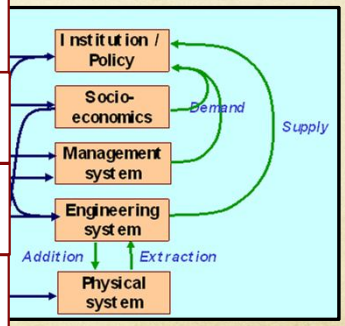
Key Element – Multi-disciplinary Integrated Modeling

How Viable is Modeling at each level?

Bridge across Physical and Behavioral Aspects

Transactional Costs of Complexity?

Transparency and Comprehensibility?



BUT ... Who Drives the Science Agenda ?

In *SAHRA* ... it was clearly the "Physical" Scientists

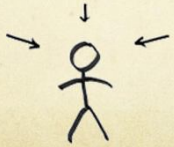
Who "*thought*" that they understood the problems that needed solving

Origins of SWAN

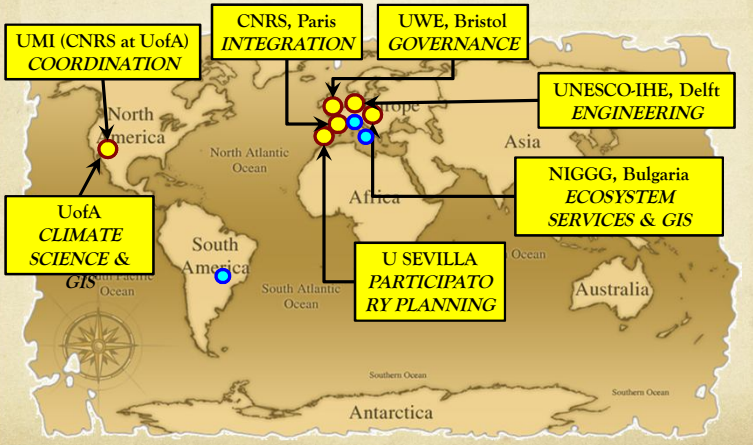
The SWAN proposal to the EU was based on the notion of *Social-Scientists* driving the Agenda

&

a "HUMAN-CENTERED approach to Science



Initial Main Participants

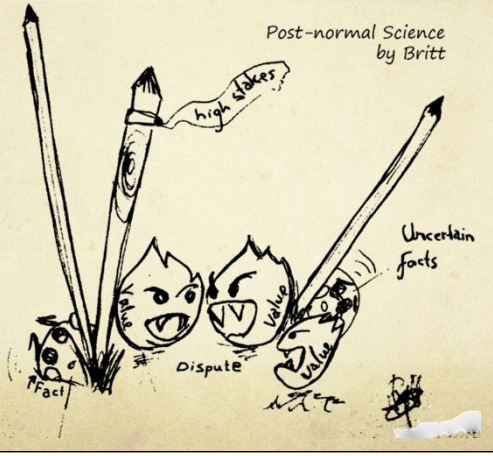


Major Theme

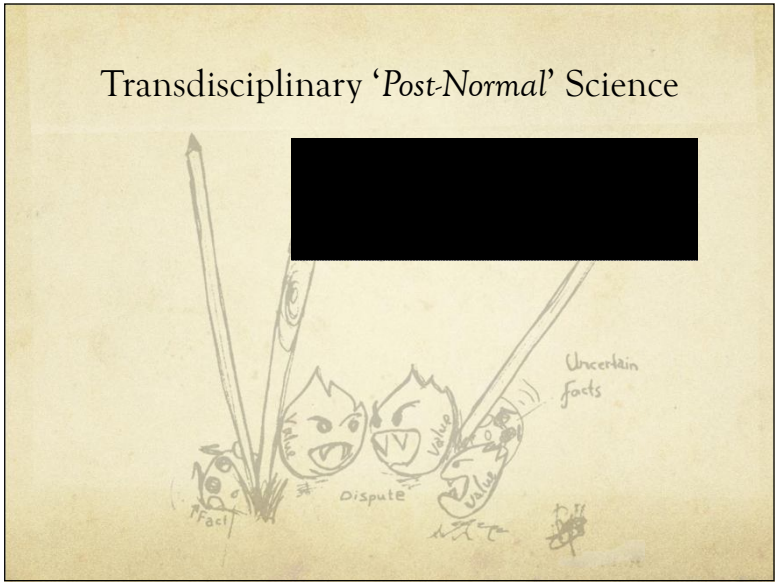
Integrating Hydrological and other Sciences into <u>Urban-Plus</u> Decision Making

We use the term "*Urban-Plus*" or "*Urban+*" to encompass urban areas and their entire supporting hydrological system.

Transdisciplinary '*Post-Normal*' Science



Transdisciplinary '*Post-Normal*' Science



Transdisciplinary '*Post-Normal*' Science

'***Normal Science***' believes it is possible to handle challenges in a rigorous and rational way – resulting in a 'best course of action' for society.

'***Post-Normal Science***' recognizes that non-equivalent perceptions and representations of reality result in legitimate but contrasting perspectives, and therefore large amounts of uncertainty.

Therefore, even the *problem structure* is under question

i. *Socially and politically relevant (who decides ?)*
ii. *Scientifically useful & consistent with knowledge*

Funtowicz & Ravetz (1993), Science for the Post-Normal Age, Futures 25
Giampietro, Mayumi and Munda (2006), ntegrated assessment and energy analysis: Quality assurance in multi-criteria analysis of sustainability, Energy 31

According to *Post-Normal* Science

May be *impossible* to obtain an uncontested legitimization of the problem structure.

This shifts the focus of scientific investigation …

From **"Searching For A Best Course of Action"**
(a definite technological 'solution' or policy implementation)

To **"Fostering Social Learning"**

~~d) Helping the actors to arrive at a useful problem structuring~~

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From **"Searching For A Best Course of Action"**
(a definite technological 'solution' or policy implementation)

To **"Fostering Social Learning"**

Thereby

"*Enhancing the social process* by which sustainability issues are resolved"

a) Looking for better issue definitions
b) Attaining better understanding of existing trends
c) Clarifying areas of uncertainty
~~d) Helping the actors to arrive at a useful problem structuring~~

According to *Post-Normal* Science

May be ***impossible*** to obtain an uncontested legitimization of the problem structure.

① In reality, ***<u>the indications</u>*** given by models and data are always mediated by political negotiation & common sense … the issue is ***<u>how to handle this mediation</u>***

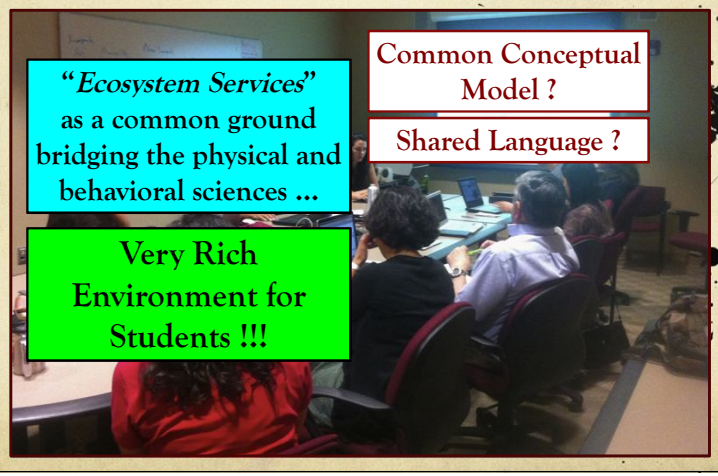
② The real issues instead are:

a) *RELEVANCE - How to decide which models can be useful for policy-making*

b) *TRADE-OFFS - How to define what should be considered an acceptable compromise among legitimate but contrasting definitions of improvements*

SWAN Has Been Operating Since March 2012

Numerous EU Student Visits & Ongoing Seminar Series



"*Ecosystem Services*" as a common ground bridging the physical and behavioral sciences …

Common Conceptual Model ?

Shared Language ?

Very Rich Environment for Students !!!

SWAN Newsletter

VOLUMEN 1 APRIL 2013

USE SWAN eNEWSLETTER

Latest news on University of Seville' SWAN team

In this issue

swan Sustainable Water Action

The SWAN Project

SWAN (Sustainable Water ActioN): ***Building Research Links between EU and US***, is a four-year International Cooperation Project granted by the European Commission (FP7-INCOLAB -2011). It focuses on the creation of a research center on water to reinforce links between Europe and United States research in the field. The project promises to strengthen European research capacity in the USA, promote competitiveness of European research and industry while also informing and involving policy-makers and the general public.

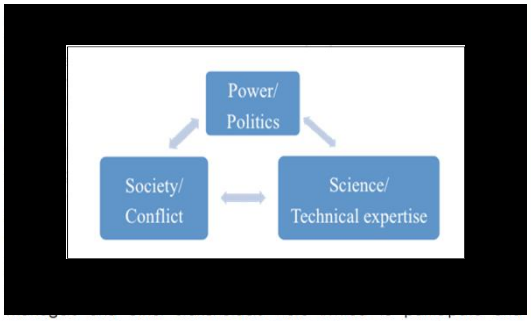
The SWAN project has five European Union Member States (Bulgaria, France, Netherlands, Spain and United Kingdom) and a University of Arizona team from the Hydrology and Water Resources Department. It is coordinated by the French CNRS (Centre National de la Recherche Scientifique), that created an International Centre (UMI "Water, Environment and Public Policy") in collaboration with the University of Arizona in 2008. This extension of the UMI broadens its current activities from a bi-national focus to one that incorporates ideas, disciplines and methods from Europe.

Past Workshops

Workshop on New Paradigms in Water Resources and Risk Management

University of Seville, January 25th, 2013

2012 Jan (Seville)



Past Workshops

2013 May (Tucson)

Challenges of Integrating Hydrological Science into Urban-Plus Decision Making

This Workshop

2014 June (Seville)

"Debates on Knowledge for Water Governance in Networked Societies"

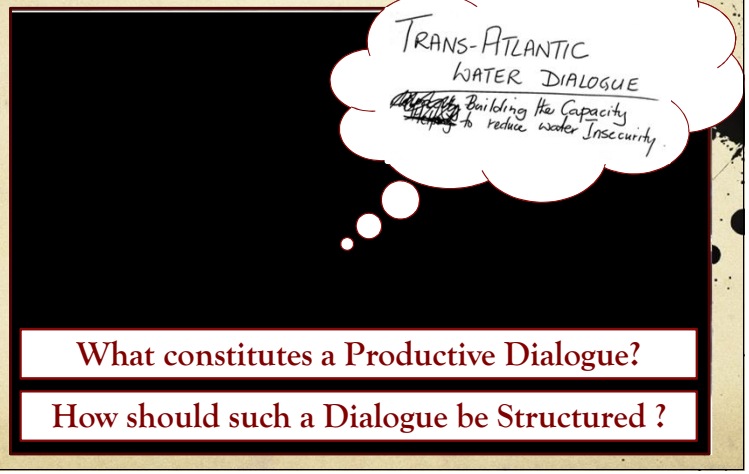
SESSION 1: Power, Communication and Policy Process

SESSION 2: Key Debates on Water Management Models/Paradigms

SESSION 3: Polycentric information for water governance: generation, quality control and sustainability

SESSION 4: Key issues in information dissemination, visualization, and translation to different audiences

Eventual Goal



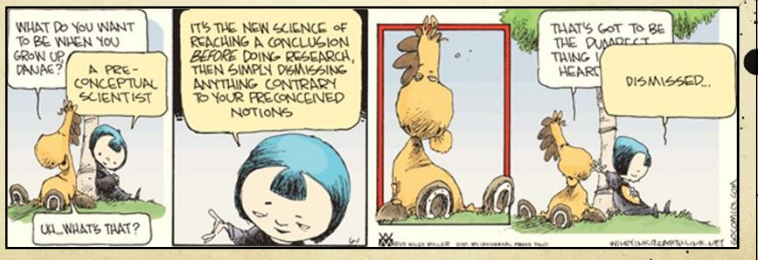
What constitutes a Productive Dialogue?

How should such a Dialogue be Structured ?

Please Participate !

Thanks !

The ~~*Post-Normal*~~ "Pre-Conceptual" Scientist



** From Wiley Miller's 'Non Sequitur' Comic Strip