



# IAHS 90th ANNIVERSARY

Prediction in Ungaged Basins  
Prévisions dans les bassins non-jaugés



## IAHS

Task Force on the New Science Initiative 2013-2022

The IAHS Decade 2013-2022

A first overview on the Science Plan



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IAHS blog on the Scientific Decade 2013-2022: <http://distart119.ing.unibo.it>

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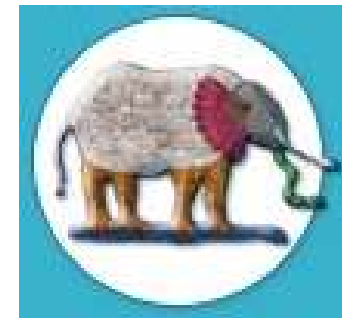
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## The new IAHS Science Initiative 2013-2022

The success of PUB witnesses the leading role that IAHS science initiatives play for hydrologists all over the world and therefore suggests the opportunity for IAHS to keep this leading role by proposing a new initiative to be started in 2013, during the IAHS General Assembly to be held in Goteborg.

In fact, the IUGG General Assembly that took place in Melbourne during 27 June – 8 July 2011 hosted a very effective debate on a potential new scientific initiative to take IAHS into the future.



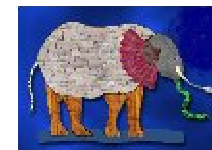
The above debate involved a large across-section of the IAHS officers and members. As a result, the IAHS Bureau deliberated and decided to create a new Task Force (TF), with the mandate to suggest a focus, title and the details for the new initiative.

The TF will be dissolved once its work is completed.



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## The new IAHS Science Initiative 2013-2022

Physical meetings in Vienna, Nanjing, Tunis, Delft, plus national meetings.  
The TF created a blog to host a first web-based discussion.

<http://distart119.ing.unibo.it/iahs>

The blog now counts 4 posts.

- 1) Opening post (Dec 2011).
- 2) First summary of the discussion (Feb 2012).
- 3) After the EGU week and towards Nanjing (Apr 2012).
- 4) Towards the Science Plan (May 2012).

So far, the blog received about 13000 single visits (about 1400 single visits per month and 50 single visits per day on average) and 52 comments by 35 different persons.

### A Science Initiative of the International Association of Hydrological Sciences



#### The new Science Initiative – First summary of the discussion

Posted on February 22, 2012 by Alberto Montanari

[Read all comments from beginning of discussion](#)

[Read comments to this post](#)

[Leave a comment!](#)

[Please read the instructions first](#)

Seventy days passed since the blog was open and I am glad to see that the first post received some 3000 visits and 20 comments, and the site received 22 new registrations. This is a clear indication that the discussion on the next IAHS scientific decade is relevant for the international community of hydrologists. I would like to draw a first summary of the discussion and to put forward one or two ideas for setting up the basis of the next IAHS initiative.

Essentially, the discussion so far has highlighted that:

- The new Science Initiative should be a substantial contribution to IAHS community building, should be inclusive (Hilary McMillan) and the subject should be attractive for funding agencies (Bettina Schachl). It should be a multidisciplinary effort (Polina Pivovarsky, Steve Schimanski).
- Hydrological change and variability, and the interaction between hydrology and society, are typical issues that deserve to be focused on (myself, Hoshin Gupta, Steve Schimanski, Gudrun Di Baldassarre).
- Uncertainty should be a keyword for the new initiative, in an innovative manner with respect to the traditional paradigm that attempted to eliminate uncertainty in hydrology (Dimitrie Rostovtsov, Christian Rasmussen).

(This discussion on the next IAHS scientific decade is ongoing)

**Become a Member of IAHS**  
Click here to learn more about the IAHS (Join a Group)

**Leave a Comment**  
Click here to add a comment to this article or to the new initiative (Join a Group)

**Contact the moderator**  
Click here to send a message to the moderator

April 2012

M	T	W	T	F	S	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
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29	30					

#### Recent Comments

- Alberto Montanari: The new Science Initiative – First summary of the discussion
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## Hydrological Change

Kabaty, Warsaw, 1995 to 2008  
Courtesy by A. Sikorska



UNEP Atlas of environmental change

Disappearance of glaciers in Uganda's Rwenzori Mountains to the loss of  
Cape Town's "fynbos" from 1974 to 2000



Shanghai, Bund, from 1990 to 2010

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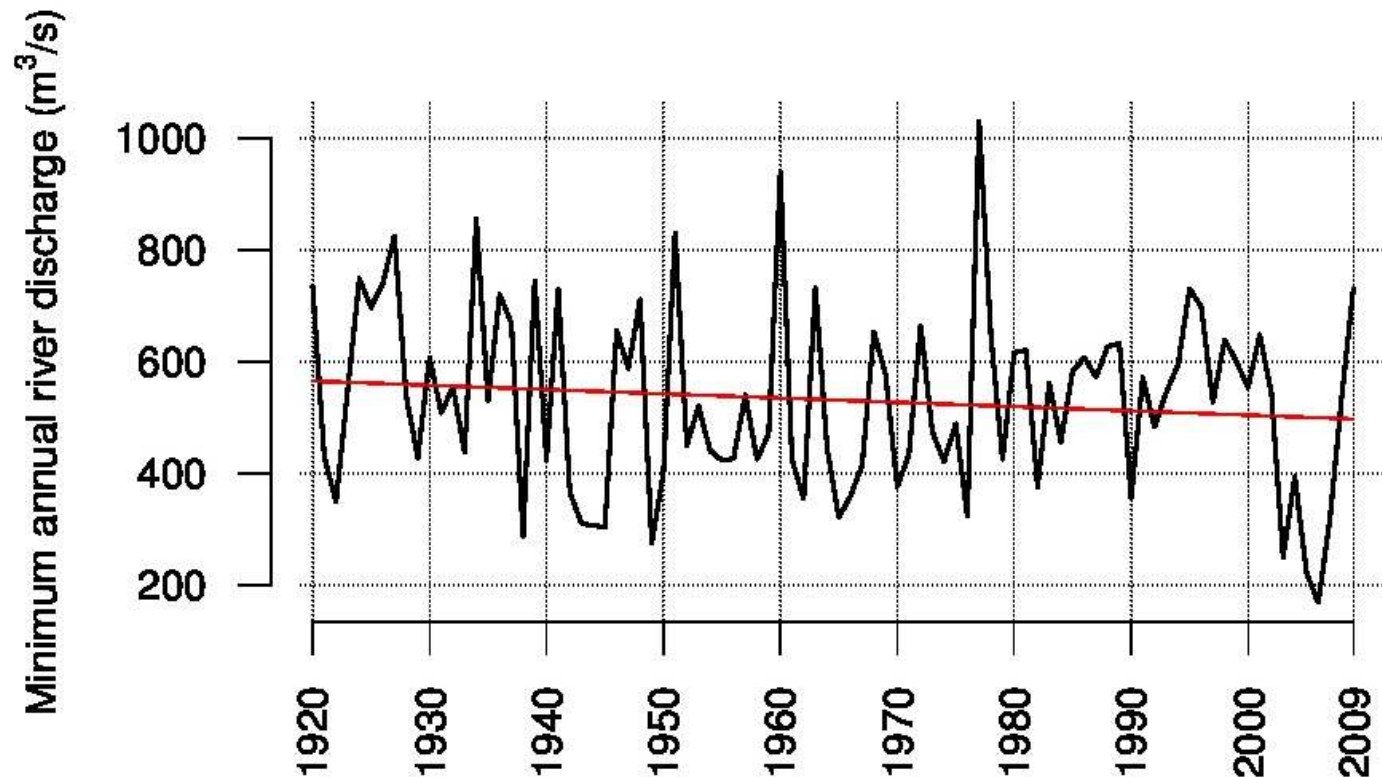


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## Hydrological Change

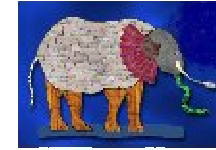


**Annual minima of daily river discharge of the Po River at Pontelagoscuro (Italy) 1920-2009**



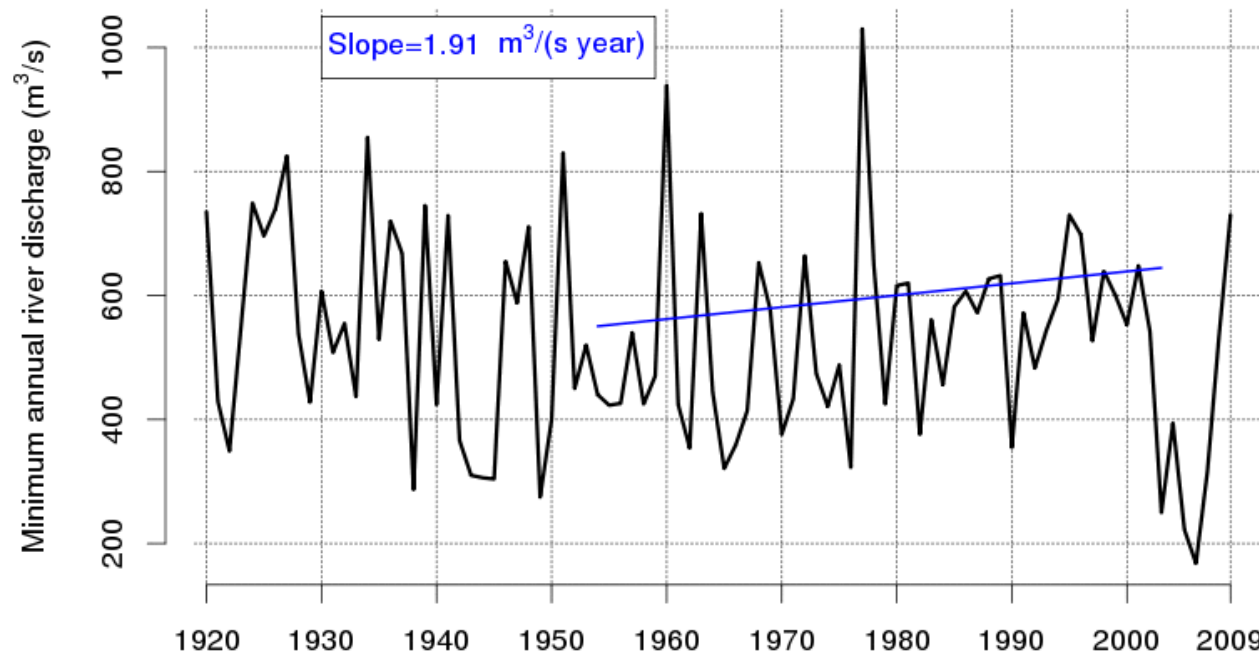
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## Hydrological Change

Po River at Pontelagoscuro 1920-2009



Regression lines are printed in red and blue for decreasing and increasing slopes, respectively.

Regression over a 50-year wide  
moving window

**Annual minima of daily river discharge of the Po River at Pontelagoscuro (Italy) 1920-2009**



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## The new IAHS Science Initiative 2013-2022

### Understanding Change of Hydrological Systems and Interactions with Humans and Society



#### Key issues

- Modelling non-steady behaviours.
- Humans as part of the system (vs pristine catchments).
- Interaction with society and stakeholders.
- Hydrological change is the interface of environmental change with humans and society.
- Integrated treatment of understanding and uncertainty for improved prediction.

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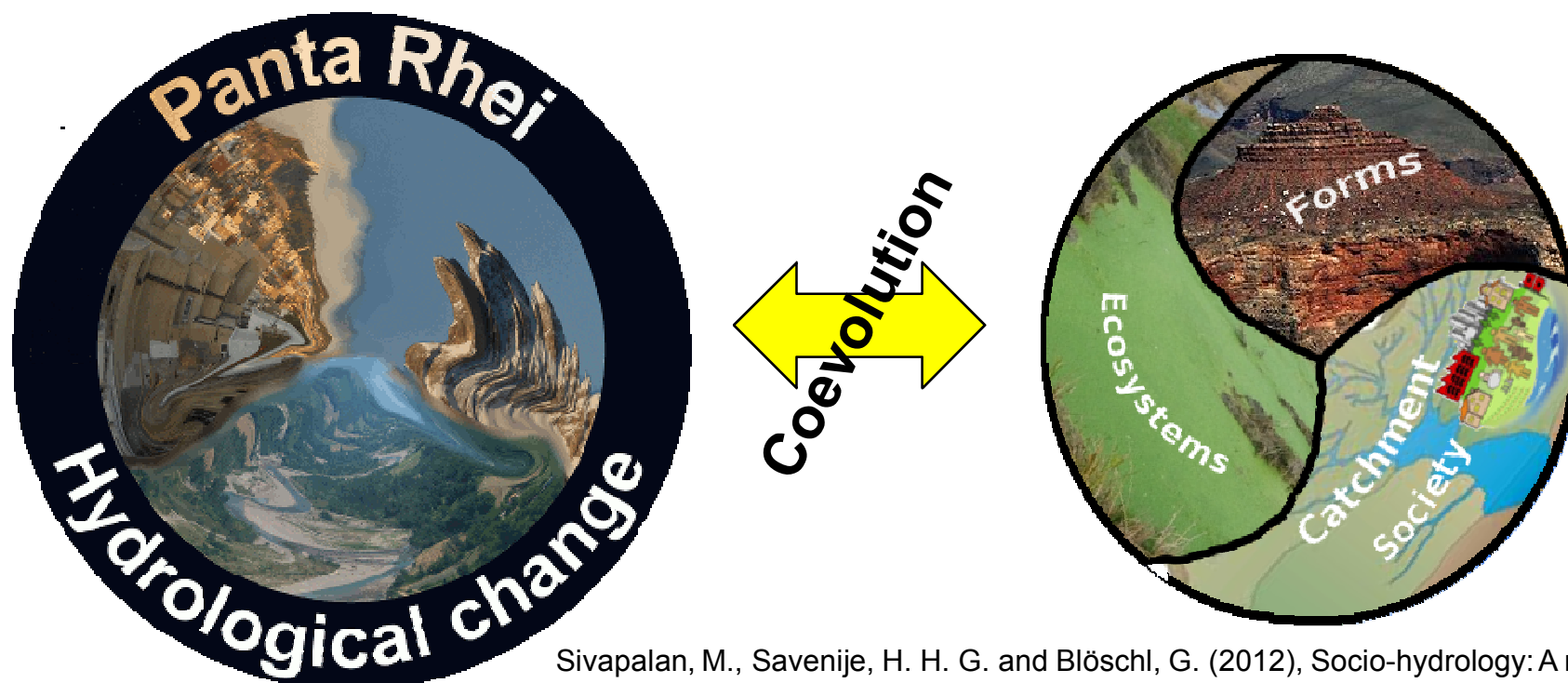
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## The new IAHS Science Initiative 2013-2022

### Understanding Change of Hydrological Systems and Interactions with Humans and Society



Sivapalan, M., Savenije, H. H. G. and Blöschl, G. (2012), Socio-hydrology: A new science of people and water. Hydrol. Process., 26: 1270–1276. doi: 10.1002/hyp.8426

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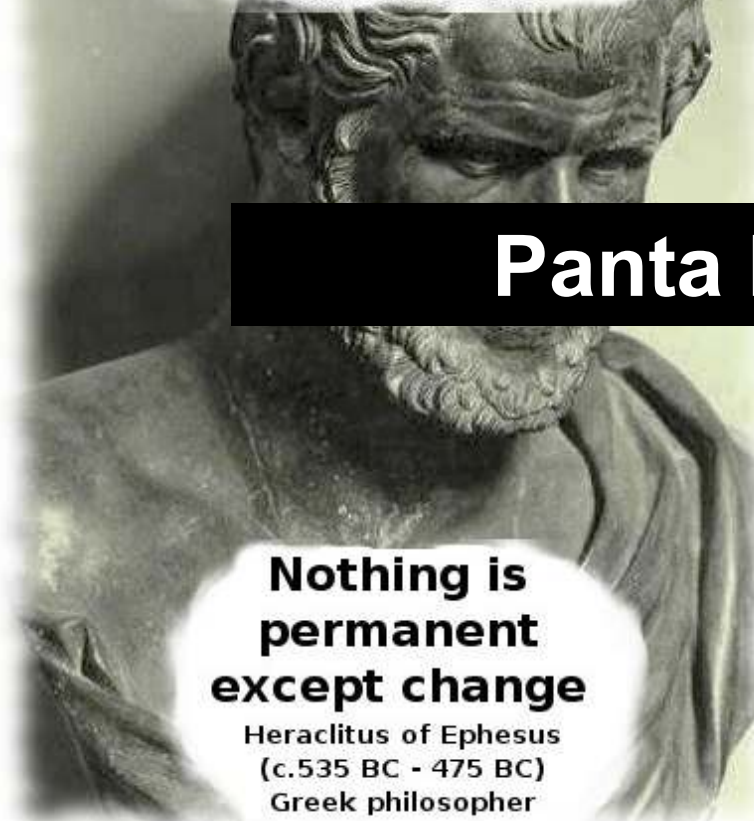
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## The new IAHS Science Initiative 2013-2022

2013  
Change  
2022

No man ever steps in the  
same river twice, for it's not  
the same river and he's not  
the same man



**Nothing is  
permanent  
except change**

Heraclitus of Ephesus  
(c.535 BC - 475 BC)  
Greek philosopher

**Panta Rhei**



They must often  
change, who would be  
constant in happiness  
or wisdom.

Confucius (551 - 479 BC)

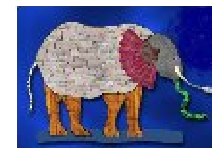
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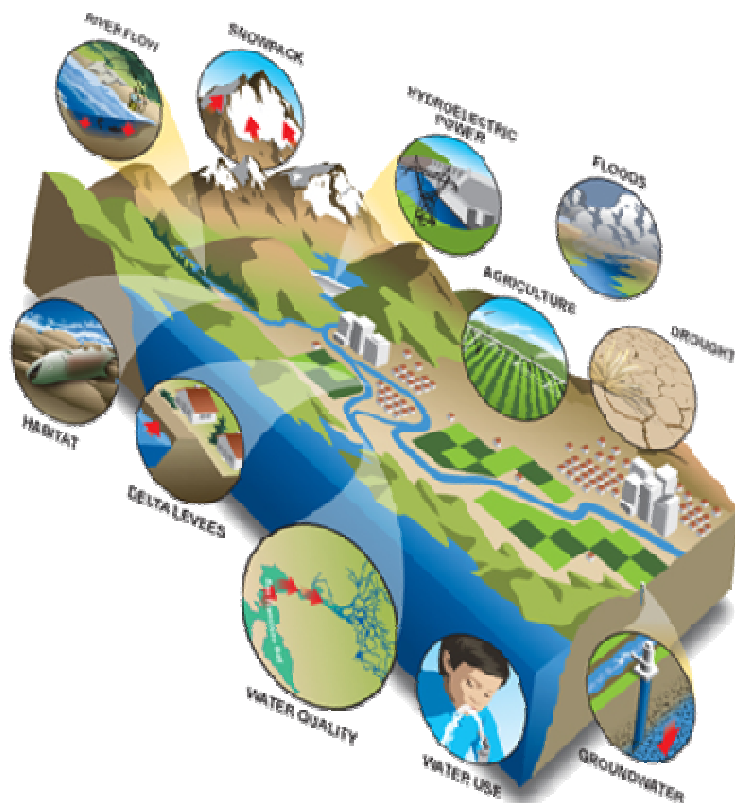


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## The new IAHS Science Initiative 2013-2022



See Gordon Young's presentation  
at EGU2012, available for download  
at the IAHS blog

### Keywords .....

Understanding, Modelling, Change,  
Society, Interconnectedness,  
Uncertainty, Indeterminacy, Risk,  
Vulnerability.

### Brief rationale .....

Hydrology and society are an  
essential part of a changing human  
and environmental system  
(Sivapalan et al., PUC Report, 2011).

It is necessary to better understand  
how hydrology changes and reacts  
to change to better serve society.

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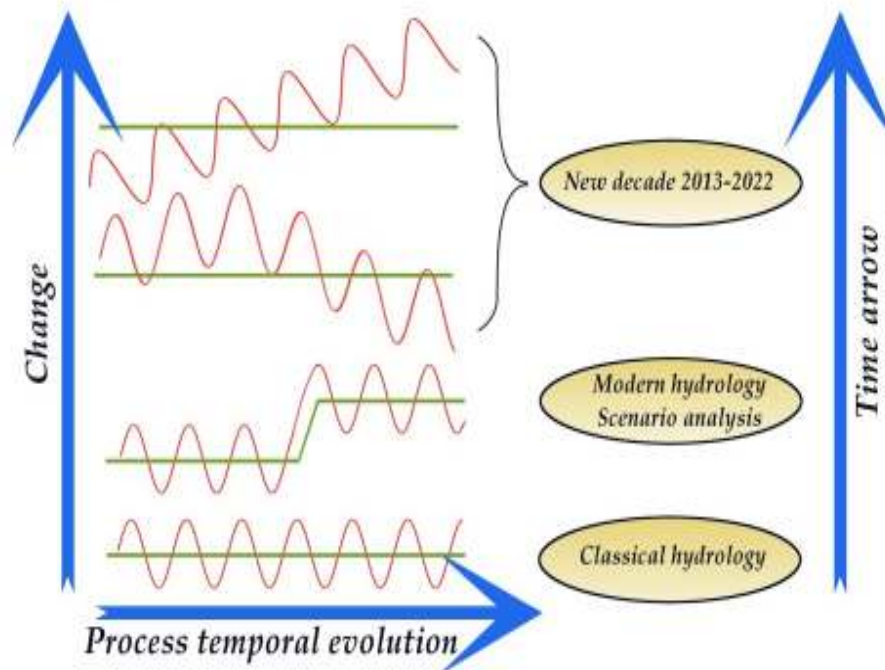
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## What's new? About the patterns....

- Hydrological systems are dynamical systems, so the study of change has always been part of hydrology.
- And the study of connection with society is a part of integrated water resources management...

So, what's new?



### 2013-2022

- Classical and modern hydrology mainly focused on short-term changes, under the steady state assumption for the system.
- Changes were frequently modelled as a sequence of steady states through scenario analysis.
- It is now necessary to study long term or permanent changes, namely, to consider leaving the steady state assumption to assess how systems change in structure along time.
- In the new decade change and humans are part of the system.

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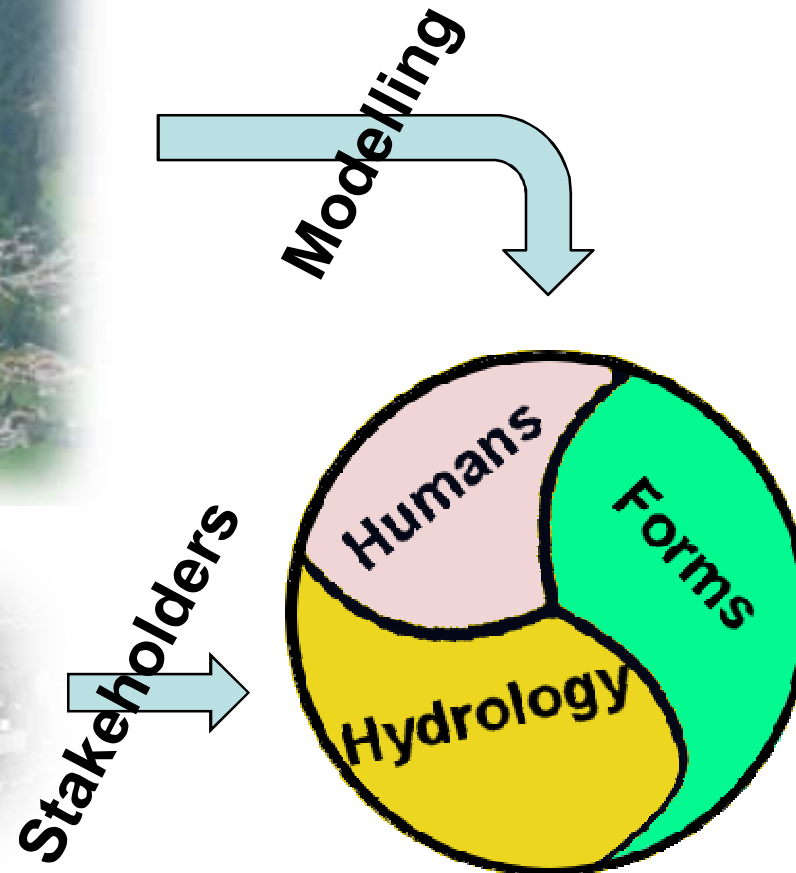


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## What's new? About processes and models....

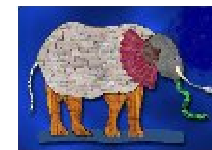






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## The new IAHS Science Initiative 2013-2022

### Targets

#### Target 1 – Understanding

Improve the knowledge and interpretation of hydrological systems, and in particular variability, indeterminacy, impacts of change, interaction with human activity. Special attention will be dedicated to complex systems like mountain areas (glaciers), urban areas, alluvial fans, and more.

#### Target 2: Estimation and prediction

Estimate and predict the behaviours and patterns of hydrological systems, with uncertainty assessment to support risk evaluation. This target includes estimation of design variables under change.

#### Target 3: Science in practice

Address societal needs, policy making and implementation.

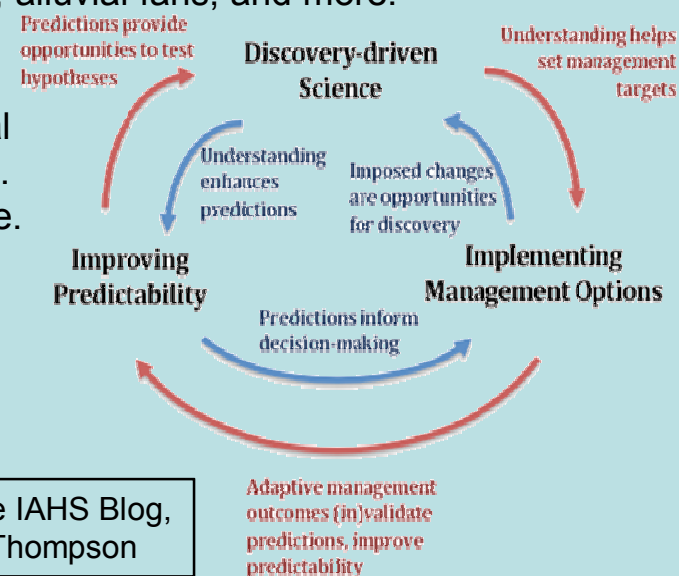


Figure taken from the IAHS Blog,  
courtesy by Sally Thompson



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## The new IAHS Science Initiative 2013-2022

### Science questions

#### **Science question 1 – referred to Target 1**

SC1. How to understand the behaviours of changing hydrological systems?

#### **Science question 2 – referred to Target 2 and Target 3**

SC2. How to integrate advanced knowledge with indeterminacy modelling and uncertainty assessment for improving prediction?

#### **Science question 3 – referred to Target 3**

SC3. How can we produce sound and transparent scientific modeling tools (open source)?

#### **Science question 4 – cross-cutting targets**

SC4. How can we make use of new observations and information technologies in a new generation of models?

#### **Science question 5 – cross-cutting targets**

SC5. How to model hydrology at the interfaces (e.g. surface/ground water interactions) and complex systems?





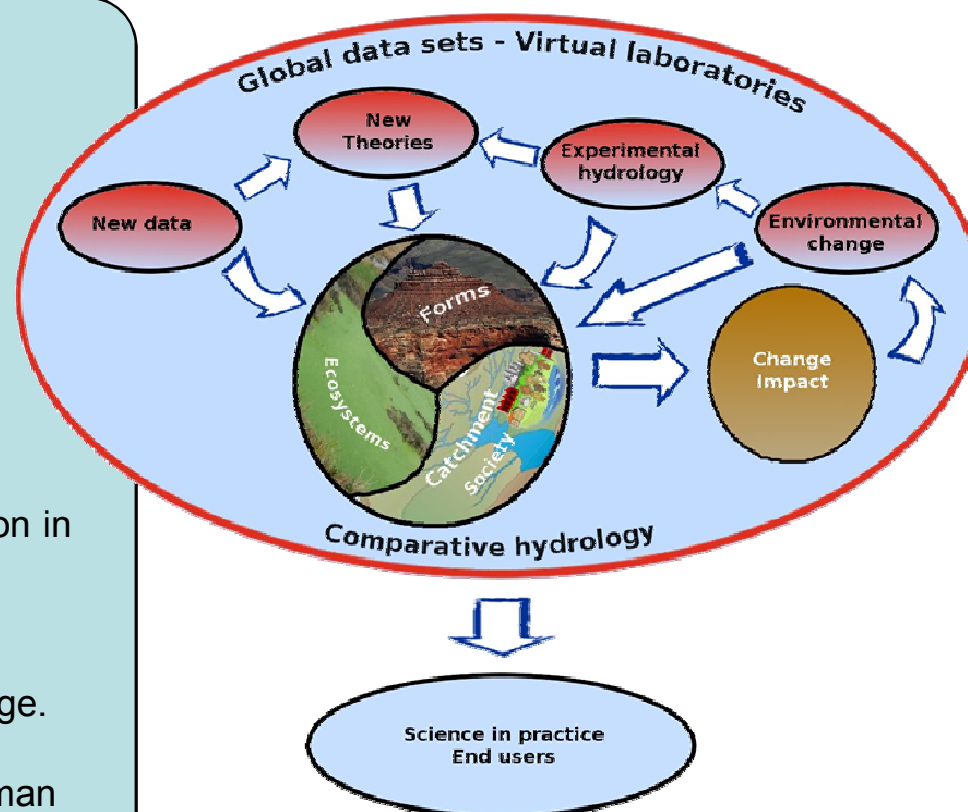
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## The new IAHS Science Initiative 2013-2022 Examples of enabling research

- Hydrology at the interfaces.
- Co-evolution and comparative hydrology.
- Innovative theoretical frameworks for uncertainty assessment and modeling.
- Newly available distributed data and monitoring technologies (see Grimaldi's initiative on the MOXI IAHS WG).
- Bridging experimental and theoretical hydrology.
- Virtual hydrological laboratories and open source modelling.
- Entropy modelling (see Koutsoyiannis' presentation in Melbourne, <http://itia.ntua.gr/en/docinfo/1136/>).
- Coupled hydrological-human systems.
- Impact assessment of hydrological change.
- Integrating climate change and hydrological change.
- Flood change modelling.
- Water resources management under changing human pressure.
- Coupled modelling of hydrological and related systems.



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## The new IAHS Science Initiative 2013-2022 Enabling research: The case of the Millenium Dam

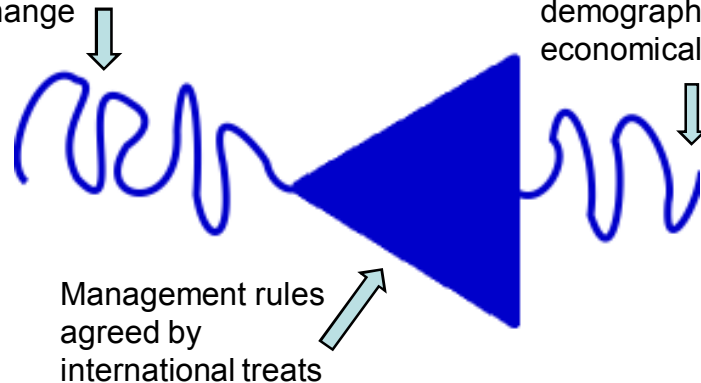


The Grand Ethiopian Renaissance Dam is an under construction gravity dam on the Blue Nile River. The reservoir at 63 billion cubic meters will be one of the continent's largest.

The dam will be the largest hydroelectric power plant in Africa when completed, as well as the seventh largest in the world.

Stochastic simulation according to assigned environmental change

Downstream water requirements according to demographic increase and economical constraints



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## **The new IAHS Science Initiative 2013-2022 Everyone is involved!!**

**The Science Initiative is a community effort: the success of the individual depends on the success of the community (see Jeff's talk yesterday).**

**Involvement is the essence of the Science Initiative: fell involved!  
Change is part of hydrology and therefore of all our research.**



**Let us look forward with bright vision!**



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## The new IAHS Science Initiative 2013-2022 Next steps

- The science plan will be made available soon at [www.iahs.info](http://www.iahs.info) (through the IAHS blog).
- **Comments from the community will be received until end of 2012.**
- The science and implementation plan will be finalised by Spring 2013.
- The science and implementation plan will be approved in Goteborg by the IAHS Bureau.
- **The New Decade will be launched in Goteborg – July 2013.**

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## Please write on the blog!

<http://distart119.ing.unibo.it>  
(linked by [www.iahs.info](http://www.iahs.info))

Your opinion matters!

The new science initiative must be really inclusive  
and a real step forward to community building.

Text to be published on the blog might also be sent to  
[alberto.montanari@unibo.it](mailto:alberto.montanari@unibo.it) by email.

### Special thanks to:

- All the attendants in Vienna, Nanjing, Tunis, here.....
- All the bloggers!!!
- The IAHS Bureau
- G. Bloeschl, C. Cudennec, S. Grimaldi, D. Koutsoyiannis, L. Ren, H. Savenije, S. Sivapalan, G. Young.



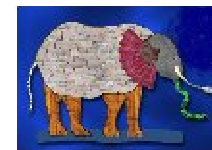
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## Everything flows!

## Thank you!

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