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## International Conference FRIEND-Water, 6-8 November 2018, Beijing

### Minute of the side-event on “Collaboration between FRIEND & EcoHydrology networks”

Beijing, Nov. 8<sup>th</sup> 2018

Animation: D. Orange (IRD, FR); P. Breil (IRSTEA, FR); M. Albaracin (Ingeraleza, EQ)

UNESCO officials: A. Amani; Ph. Pypaert; A. Szollosi-Nagy

+ 27 persons attended the side-event.

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This side-event was to figure tracks of collaborations between FRIEND - a cross cutting IHP programme – and EcoHydrology IHP theme. This, by considering the coming challenges to be addressed in term of water stress and land response to climate change, with the objective to contribute the next IHP phase. A brief introduction on the EH principles was given, in relationship with the hydrological description of a watershed. Rapid examples on problem solving approaches considering the increasing pressures put on water resources at river basin scale has been highlighted.

A cross-scaling work between EH and hydrologist:

- EH scale of operation: small to large watershed? Discussion opened: EH is a problem solving method based on manageable drivers in terms of hydrology and biota (dual regulation). It has consequences on the land management and water flow management. The scale to which EH can be efficient is case dependent, but it will depend on the decision maker level which has the power to act on the identified drivers. We can assume that large scale territories would result in a long process of decision with policies adaptation. We still have to demonstrate that EH methodology is efficient – developing demosites- which better fits with rapid decision, people empowerment, and reactivity. Large scale would be addressed by the cumulated effects of local actions. The example given on the dam discharge manipulation of the Guadiana river (Portugal) is a good example. The objective was to recover land practices and shell, fish production that were lost because of a timely lack of water and nutrients at critical periods in the delta. A cost-benefit balance concluded to the interest to recover the lost ecosystem services by delivering given amount of water at given time. The action is very local because it concerns the hydraulic work management but the result concern a quite large area of the delta with a direct interest on the hydrological pattern.

Resume on the expectations for IHP9 from EH group:

- Recall for problem solving methodologies which can address the water securities challenges in face of CC and world’s population growth – Urgency for actions;
- IHP9 is seeking for problem solving approaches;
- Need to reactivate “Experimental Representative Research Basins” as to better understand the effect of the no longer stationary relationship on which water management project were based in the past;

- Better figure on how EH can cope with MDGs goals and other international trends to cope with GC (between urban and rural arena, between natural and ..) – key words : oriented solutions, NBS (Nature Base Solution);
- Coastal and lake food production management is an important concern for which interest of EH should be managed;
- How EH could address water extremes, flood & drought, which have both inconveniences for human and interests for ecological dynamic;
- Attract Chinese colleagues on Urban EH;
- Interest of EH for GW management needs to be better explained. *Collaboration with GWADI is in the pipe (info from G. Arduino).*
- Better figure the soil compartment in the biochemical reactors of EH.
- .....

Then a discussion between participants came out to the major following points:

- It's time for adaptation to increase the resilience of the hydrosystems: to focus on Water Reservoirs, with free surface (lakes, marches, ponds) and into the soil. Collaborative works with scientific groups on lentic waters and on groundwaters (e.g. fisheries, sponge cities).
- The FRIEND group asks to work more dealing with sustainable water management and human well-being: full interest to close collaboration within ecohydrology and socio-hydrology. A mix between Water Security and Food Security.
- A new important paradigm to raise in hydrology is the non-stationnarity processes.
- The soft engineering could revitalize the serial database networks: intelligent sensors, ultra-precise remote sensing images, artificial intelligence (AI) and internet of things (IoT), ...
- The rapid improvement in last years of remote sensing technologies in terms of both frequency, resolution and information density (256 canals) opens new opportunities to better model the air-soil interface (critical zone) on large territories, that was not possible till now. This possibility must not be neglected for EH implementation, in particular for developing countries where field data are so often a barrier to relevant modeling. Scientists from this side should be involved.

Conclusion:

- There are expectations for IHP9 to develop problem solving approach like it is done in EH;
- A large agreement on joint-collaborative work between FRIEND and EH;
- Regional hydrology and flow regime characterization can emphasize the comprehension and role of the hydrological template that regulates ecohydrological functioning. Nowadays, ecological and societal based approaches for watershed management including ecohydrology and socio-hydrology should be precised;
- This governance will match with the IHP9 seeking for problem solving approaches (PSA) and nature base solution (NBS).

How to do:

- by creating opportunities for cross working activities between FRIEND & EH;
- by increasing the offer for EH training at different levels;
- **For IHP8 (i.e. from 2019) : Cross invitation between FRIEND & EH symposium** to participate dedicated sessions during their conferences ; contribute training – master classes, including field trips for tangible problem analysis. Possible rapid actions have been cited:
  - A common session and a common fieldtrip during the next FRIEND-Nile conference at Khartoum in October 2019 (contact: A. El Tayeb and D. Orange);
  - A common session in the next EH international conference (2020) in Faro (Portugal) will be proposed during its preparation on January 1919.

- **Promoting EERB (Experimental Eco-River-Basin sites)**, which would be a joint experimental research river basin as a demosite, between EH program and FRIEND where Ecohydrologists and Hydrologists, amongst other disciplines, could make effective the experience gained, to demonstrate from the field on how an appropriate land and water management, in combination with eco-engineered solutions, would contribute to the water security objectives, and behind the Well-being, the Food production, the Climate mitigation and adaptation, the Biodiversity enhancement, the Human Health, the sustainable resilience ... Some future EERB possible demosites have been cited:
  - On the Medjerda Basin, Tunisia, to deal with the continuum continental to coastal area in term of sediment fluxes (contact: O. Amrouni and G. Mahé);
  - On the Sine-Saloum Basin, Senegal, to deal with the agroforestry in arid to contribute to food production and groundwater recharge (contact: W. Faye and D. Orange);
  - In China from Guoqing Wang (??);
  - ???
- **A cycle of FRIEND-EH joint-seminars** each 4 years is under question ?
- Developing the academic training offer by connecting masters from different universities, and by sharing PhDs
  - Both IRD and IRSTEA are involved in projects of international collaborations between universities. This is the place to develop graduate level in EcoHydrology. On its side UNESCO can acknowledge this contribution in the form of chairs or UnitWin projects. These inter-universities projects will contribute and strengthen the educational component of the coming IHP9.

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ANNEX: Official text to cover the Topic 6 “**Integrated watershed management including eco-hydrology and socio-hydrology: Ecological and societal based approaches for watershed management.**”

**FRIEND-Water 2018: 8<sup>th</sup> Global FRIEND-Water Conference  
Beijing, China  
6-9 November 2018**

**Hydrological Processes and Water Security  
in a Changing World**

**TOPIC 6**

**Integrated watershed management including eco-hydrology and socio-hydrology:  
Ecological and societal based approaches for watershed management.**

*Mediator: Orange Didier (IRD, Eco&Sols), Pascal Brei (IRSTEA)*

How human needs and wellbeing interact with quantities and qualities of the finite natural resource base, and how changes to the natural environment impact on human activities and vice versa, are the key questions underlying the conceptual development of ecohydrology and socio-hydrology. The Ecohydrology project, as part of the IHP, is a solution-oriented approach for the enhancement of Water resources, Biodiversity and ecosystem Services for society and of the Resilience to various forms of anthropogenic impacts (WBSR). Among the first drivers, the soil quality with its vegetation cover and geomorphology directly controls the stream water quality and quantity, through both lateral and longitudinal connectivity. And above all, the rainfall distribution and intensity have a major impact on the quality of the soil and its vegetation cover. Due to the lack of hydrological monitoring in developing countries, the knowledge of regional hydrology dealing with water resources and its extremes is a necessary template to develop regional Ecohydrology.

Finally, the hydrologic mechanisms, including flood and drought events, underlie the climate-soil-vegetation dynamics and control the most basic ecologic patterns and processes, both for biota and materials. However agricultural practices and policies (crop calendar, tillage technics, fertilizer amendment), water control infrastructures, roads and building structures, urbanization can have a greater impact on water related services. Then the identification of the general principles of a human-dominated landscape should not be based on their only functional constituents. It should be assessed through the effects of the decision rules of local actors on water and soil resources natural regeneration capacity. Regional hydrology and flow regime characterization can emphasize the comprehension and role of the hydrological template that regulates ecohydrological functioning. Nowadays, ecological and societal based approaches for watershed management including ecohydrology and socio-hydrology should be precised.

Presentations dealing with ecohydrology and (or) social-hydrology in relation to regional hydrology are very welcomed. The objective of this session is to set-up a core group of interested persons to develop more integration between FRIEND and Ecohydrology IHP programmes.