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***Object* : Working Paper on Integrated Water Resources Management (IWRM)**

Followed by: P. Vaillant, ISOCARP representative at the UNESCO
Associate Researcher at the UNIVERSITY OF LORRAINE, Nancy 2, LOTERR Laboratory, EA 1135
Post-doctoral research in partnership with Madjula Inc. (Broome, AUS.) & IWC (Brisbane, AUS

Thematic Dossier

Integrated Water Resources Management (IWRM) In Africa enlightened by organic thought

Summary:

Prerequisite: Access to water, source of all life

Conclusion :

The main references:

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Prerequisite: Access to water, source of all life

Water is the source of life, it is the common denominator of all the challenges regarding sustainable development. Irina Bokova reminds us that :

"Improving access to water, also enables millions of girls to go to school instead of walking miles to the well, improves maternal health, reduces child mortality and preserves the environment. (...) We need to better understand the complex interactions between resources which are related one to the other, such as that between water, food and energy. And we must recognize that it is impossible to manage these resources sustainably if we treat them separately. (...) The durability depends on our ability to understand these connections and build better policies capable to apprehend in a more integrated manner the interconnected resources. (...) Sustainability also depends on better cooperation between all those involves in the water business - the policy makers, the scientists, the public and private enterprises, who too often ignore one another even though they depend on one another (...). What we still lack is better governance (...). "

Message from the Director General of UNESCO, Irina Bokova for World Water Day, March 22, 2014

Water is not a product like any other: it is the source of life.

The first dimension of water, as a source of life, is culture. It primarily improves to the quality of life of the people and the communities before being a "useful product for the economy." The priority for men and communities must be the quality of the water, the air and the land.

At the source of science is culture and human perception. All the facts of science and the scientific theories are based on perception. To forget this leads to *Mischalleous Concreteness* type of errors (ie taking for real what is abstract): science becomes disconnected from reality. The "connection to the territory" is the source of all knowledge, and only an organic (and generalistic) science, can articulate their spacialities and express their wealth while broadening the scope of their application (*Ref.* 01, Whitehead, Process and Reality, 1995 , p.17, abbreviated PR17). Here the separation between "human and non-human" disappears to be replaced by an interconnection of people and things (those relations being internal as well as external). The organic approach is consistent with the statement of Redstone indigenous peoples (*Ref.* 02) and the UNESCO approach between science, culture and education. Without any cultural awareness (and education), there is no science in action at the service of man. The link between science and culture is essential, through education.

The science of the water cycle (precipitation from the sky, runoff, evaporation and evapotranspiration from plants, the refilling of water table and the underground waters), is the science of the organization of space (*Ref.* 03: R. Lambert, 1996); Indeed: not one single development project can do without taking the flow of water into account.

Science must therefore help to protect the quality of the water, the air, the climate and the environment, to improve the quality of life of the communities. It is part of a process of governance, of a participatory democracy and local participation first, then regional and national or wider.

This governance, on an organic basis, is transcultural (and dialogic Ref. 04 Freire, 1974), multi-scale (Ref. 05: Golfier, 2011), transdisciplinary. It goes in an upward direction from the local community to the region, the nation, the subcontinent and the world (Ref. 06: JP Husson, 2008). It takes into account the natural resources and their relationship with the landscape (Ref. 07 Michel Deshaies, 2007 and 2013).

This paper is designed as an evolving tool for each participant at the Forum to bring together his own observations, experiences, and compare them with the approach outlined below. The approach is methodological, operational, while citing all its ontological, philosophical and cosmological assumptions.

It is therefore called to feed the observations, comments, criticisms, contributions that will be made during the Forum and all of these elements will have to be noted so that the proposed approach can evolve and perhaps inspire participatory approaches such as the one undertaken by Bruno Latour on Livelihoods (*Ref.* 43), on an organic basis.

An evolving pedagogical DVD accompanies this folder and can be supplied on demand to the NGO Liaison UNESCO. It aims at contributing to dialogue and participatory research in the medium or long term.

A - What is organic thought ?

What are the *Drops of experiences*? :

The *"Drops of expériences"*, also termed "actual entities" are "the final real things of which the world is made up" (PR 27). "Like the atoms of Democritus they are microcosmic entities, aggregate of which, termed *societies* **or** *nexus*, **form the macrocosmic entities of our everyday experience –tree, houses, people. But whereas the atoms of Democritus are inert, imperishable, material stuff, Whitehead's actual entities are vital, transient** *"Drops of expériences, complex and interdependent"* (Whitehead, *Process and Reality*, p.28, abbreviation PR 28)

They are *units of process*.

Donald W. Sherburne, related to Process and Reality Whitehead, 1965 translation H.Vaillant 1993 Glossary entry "actual entities". (Ref. 08)

A1 - Methodology of the drops of experiences:

Drops of experiences are the essential process for any action in one's daily and professional life, from the simplest to the most scholarly action. That's what each of us does "in practice". What everyone assumes "in practice" determines the universal concepts of "core of common sense" that crosses ALL cultures (Ref. 09, Griffin, 1998). "In practice," every action takes place in five stages or phases:

- **a -** An apprehensive step, an analysis or "audit" of the situation. The purpose at this stage is to lead a network of actors, and manage interactions. This generally leads to a diagnosis, an "inventory." This is also the first phase of our FORUM: we want an inventory of NGOs on the ground to be able to go further. But what does « going further » really means ?
- **b -** It's first to have a goal, a vision, a purpose, namely, knowing "where we are heading." It is the tags that can guide us, as they guide us in the mountains, or on the sea. They are sometimes called objectives, but the notion of objective is ambiguous. There are long-term goals (the headlights of a car), or short-term goals (the car codes). In the long run, those are the goals, visions, purposes, aims, ends. In the short term, it is the propositions for the next step. The question of the purpose of the FORUM has been asked by many as a prerequisite to the development of a program.
- **c -** This is the stage of the elaboration of the collaborative proposals. These proposals coordinate information in the sense of vision, and assume a strong cooperation to finalize these proposals. The transition from vision to strategy is proposed: here, one tries to achieve the vision in the light of the reality, to proceed to an inventory so as to adjust the possible solutions. These proposals may form a program. But what do we do with all the emerging proposals?
- **d –** Here, one must decide one the implementation of one particular proposal, to determine which one will be implemented, to make a judgment in a decision process.
- **e -** The last step is to commit oneself to the action which has been implemented and and evaluate it.

The terms may change from one group to the other, several terms have been proposed in the phases going from **a** to **e**. But each of these phases is essential and unavoidable. Indeed, a project, whatever it is, will be poor if there is no vision, it will be ineffective without a good proposal, and inadequate (and ultimatelu ineffective) if the inventory of the situation is not adequate, wavering if the decision making process is not good, and aborted if the commitment and the implementation are not up to standards. The thesis on geography & development written by P. Vaillant (Ref. 10: P. Vaillant 2008) analyzes more than 15 steps of territorial development and planing: all cite these 5 steps, using different names though. A postdoctoral work in Australia has brought from 15 to to 23 the proceedings of the organic type that enrich the basic scheme (Ref. 11). This approach of the *drops of experiences* is further implemented at the University of Poitiers at the Institute of Social Territorial Dialogue (Ref. 12: P. Braconnier 2005). We are at the heart of the issues of governance and democratic participation. The stages of *drop of experiences* are simple, practical, and even those who have other theories use it "in practice" to take action. It is an observation that everyone can make, from his own examples, even working with different people, such as Nyikina people of Kimberley, Western Australia, cited below.

The simplest example which shows that it is applicable to any situation in ordinary life is the example of the housewife who is preparing a meal. She wants to receive friends and dreams of a convivial meal. In order to achieve that goal, she studies what's left in her fridge and thinks about the various menus she can cook. Because some of the items she needs are present in the stores while others are missing, she will have to make decisions that will alter what she had been previously decided upon, and she will have to do it quickly. Later, she will start cooking her meal - the guests will later be responsible for the evaluation, keeping in view the satisfaction of everybody.

Here are some other examples, from seminars and technical works : the teacher in his school interacts with the students, the parents, and the other teachers (a). He contributes to the educational vision of the school (b), proposes an educational project for the current year (c), this project is validated by the instances of the institution (s) and then put into actions (e). Another example : the engineer who built a water tower on top of a hill close to a housing estate will engage in a participatory process with the local inhabitants (a), adopt an urban vision (b), which is declined in propositions by a contractor (c), decided upon by those elected to do so (d), and then realized by companies and enterprises (e).

From there, each person in his life will be able find his own examples, always more professional, more scientific, more social. *Drop of experiences* can have scientific extensions (its scientific name is *quantum of actualization* (PR434) or *actual entity* (PR18)) but also philosophical (systemic philosophy / organic philosophy or process philosophy) and even cosmological (micro / macro approach, underlying ontology…). Any cultural diversity can thus be accounted for because DE freezes nothing, and in this sense this approach is "universal". If some facts are not taken into account, then the organic scheme must be changed, one must make it evolve. That's the reason why this organic approach is a *radical realism*. It is flexible and evolutive. In technical terms, it is a panexperiencialist panpsychic constructivism, which summarizes the expression *radical realism*. D.Debaise also speaks very simply of *speculative empiricism* (Ref. 13), probably in response to William James' *radical empiricism* (ref. 14) of which Whiteheads' work is an extension. The two best introductions are those of Michel Weber (*Ref*. 15) and Isabelle Stengers (*Ref*. 16). The best in-depth analysis can be found in the thesis of Jean-Claude Dumoncel 1986 (*Ref*. 17) because all the links between analytical and organic are drawn therein. In short: everything is taken into account. If it does not, the organic scheme must change ... It's up to us test it... and see the fertility which is in direct link with the threefold purpose of the UNESCO, see details below.

Many writers can relate to this generalist organic thought. A.N. Whitehead, a career mathematician and logicia, co-author with Bertrand Russell (his student and future Nobel Prize winner), of the famous *Principia Mathematica*, proposed the most complete and successful scheme, a scheme which is both philosophical and mathematical. The recognized founders (Ref. 18: Griffin, 1993) are Charles Sanders Peirce (1839-1914), William James (1842, 1910), Whitehead (1861-1947), Bergson (1859-1941), Hartshorne (1897-2000) and Teilhard de Chardin (1881-1955, *Ref*. 19). A form of organic thought is present in the approaches of John Dewey (1859-1962), and Raymond Ruyer (1902-1987, Professor at the University of Nancy 2, now the University of Lorraine, ref. 20). It is a generalist thought (*Ref*. 21, Rescher 2006) both philosophical and scientific which is developing in all the disciplines : see the important work of international census of Michael Weber in the *Handbook of Whiteheadian Process Thought* (*Ref*. 22, DESMOND & Weber, 2008). (See figure 1 below)

A2 - The schematic diagram of the drop of experiences (DE)

The drop of experiences was exposed in plenary session of the preparatory committee of the Africa Water Forum 2014 in June 2013 and was presented at the 49th ISOCARP Congress in Brisbane between October 1st and 4th 2013 (Ref. 23: publication ISOCARP) then at the Armidale Peace Conference which was held between the 13th and the 15th of October 2013 (Ref 24) and at the Conference on Resilience in Montpellier between May 4th and May 8th 2014 (*Ref*. 25). (See Figure 2 below).

The 5 phases of the methodology of Integrated Water Resources Management (IWRM) developed by the UNESCO-IHE (*Ref*. 26) are drawn in gray under each phase of the *drop of experiences* (DE). Indeed, a correspondence to the phases of the DE can be observed, as explained below in part B2. It's simple, clear and scientific at the same time. The advantage is that the D.E. is an open gate to the symbolic, cultural, or even spiritual dimension. It allows us to follow simultaneously the three vocations of the UNESCO, i.e. science, culture and education. This will be explained below in Part A4.

Figure 1: The 18 disciplines and some of their authors, fed with organic thought, as described in *Handbook of Whiteheadian Process Thought* (*Ref*. 22, DESMOND & Weber, 2008).

A3 - The cutting edge of science: from perception to quantitative data

The *drops of experiences* are *"the final real things of which the world is made up" (PR 27)* (see also Ref. 08: Glossary of Sherburne, 1966). The transition from one scale to another is done through the method of *extensive connection* (evolution of the *extensive abstraction* method theorized in the first Whitehead trilogy, NC, KFN, PREL (RÈf.27) towards this key concept, to be found in the second trilogy SMW, PR & AI, (Ref. 28) as explained by Schmidt & Palter 1967, 1960 (Ref. 29)). Another key concept is the notion of *internal relation* between things, something that can no longer be denied by a science that incorporates quantum mechanics. All these notions are experienced and obvious to indigenous peoples, and many misunderstandings arise from the loss of connection to oneself, to one's body, and to nature, in the Western culture, forcing us to theorize one's obvious everyday life experience and render complicated what is otherwise simple (and not simplified) .

The most recent scientific theories, including quantum mechanics and relativity theories are thus integrated into the organic approach. The whiteheadian organic scheme is the most accomplished to date. The relationship of each phase of the concrescence, see figure 1, with the quantum theory has been carefully carried out in 2004 in Michael Epperson thesis (Ref. 30: Epperson, 2004 and TE Eastman & H. Keeton, 2004). The correspondence with the quantum process is in complete accord with the interpretation of the Copenhagen School, which gives the drop experiences its most advanced scientific character, confirming all the traditional and scientific knowledge of the indigenous peoples. With such a scientific approach, the indigenous peoples have a tool which allows them to express themselves and communicate, and in so doing, show that they are more advanced than Western civilization, which has not yet assimilated these concepts in its daily life (or has not "found them again", because long before they were colonized by the Greeks and Romans, the Celts and the Gauls had an organic approach). The passage from vision, *pure potentiality* (b), to proposition, *hybrid potentiality* (c), and then to *real potentiality* (d), is enshrined in the collapse of the function of the wave. "Therefore, the transition from" possible "to" real "[during the reduction of the wave packet] takes place during the act of observing" (Ref. 31: Heisenberg 1971). The *drops of experiences*, according to the phases of quantum mechanics, describes the transition from *virtual* to *real* to pure potential. This is the new paradigm of science, *The New Alliance*, described in 1983 by Isabelle Stengers (Ref.16).

The organic thought is also, in that sense, the science of symbols, and the explanation of the effectiveness and the importance of cultural symbols. "*All this will be explained one day in terms of symbolic logic*" Whitehead wrote to conclude one of his last works, *The Interpretation of Science* (Ref. 32).

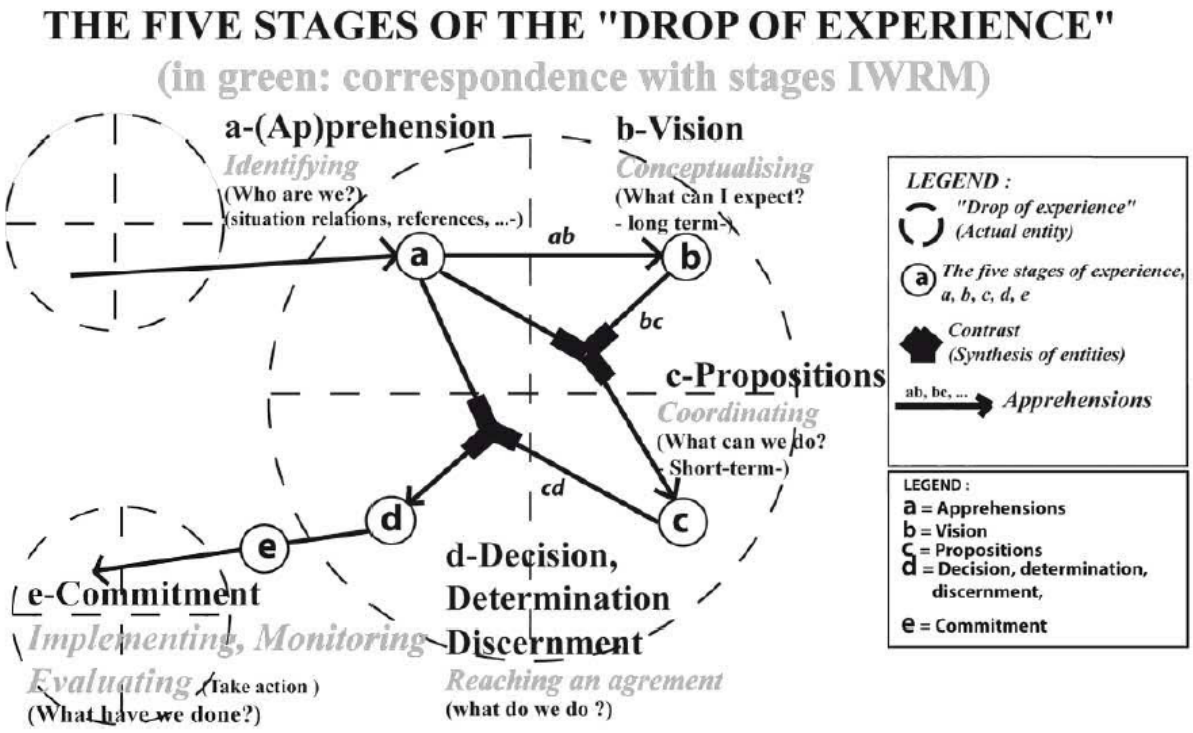


Figure 3: The five phases of the *drop of experiences*. Source: A.N. Whitehead, *Process and Reality,* Gallimard, Paris, 1995, p 579, Part III (from the 1929 English original, edition amended in 1978) in a model developed by S.T. Franklin, *Speaking from the Depth,* Wm. B. Publishing Co. Michigan, USA, 1990, 410 p. adapted by P. Vaillant (Ref. 10), and compared to the IWRM.

As most African indigenous cultures, one of the culture that illustrates this with the theme of water at its core, is probably the Aboriginal culture, like that of the Nyikina People of Kimberley, WA., one of whose member is Paddy Roe, ... Their name is "Yimaardoowarra," the "water people" of the Maardoowarra River, the name given by the aborigines to the Fitzroy River, WA. A 1990 film about the Maban (shaman) Paddy Roe explains how the culture transmitted by Paddy Roe fully integrates quantum mechanics in a cosmology called *bugarragarra*. (Ref. 33).

Our western philosophical and scientific roots, revisited in the light of recent discoveries in the fields of general and special relativity, and especially in the field of quantum mechanics, lead to an organic approach. The founders are Charles Sanders Peirce, Bergson, Dewey, Hartshorne, Teilhard de Chardin. Closer to Isabelle Stengers, DR Griffin, Michael Weber, Claude Dumoncel, JM Breuvart, Station, (Australia). The pedagogical foundations are to be found in Sherburne, ST Franklin, E.Krauss, Weber says, Debaise D., P. Vaillant. The key concept is that of concrescence, or *drop of experience*, which can be divided into 5 phases.

A4 - The link between culture, science and education, the triple objective of the UNESCO (introduction)

Organic thinking creates a simple, clear and fruitful connection in terms of social dialogue and scientific research between the Aboriginal and the Western scientific cultures. The key is the *symbolic function,* with the passage from sensitive perceptions (the 5 senses) and non-sensitive perceptions (memory, ...) to the physical and mathematical models of reality. Just as the body is an organization that aligns 11 body systems (skeletal, muscular, nervous, blood, endocrine, cardiovascular, respiratory, skin hair nails, lymphatic and immune, digestive, urinary, reproductive), nature is composed of mineral, animal, plant and human organisms, each one of them harmonizing the component systems.

Stronger and stronger is the urge to organize a conference to articulate *systemic thought*, established long ago at the UNESCO, with *organic thought.* Regarding *organic thought,* Ludwig Von Bertanlaffy, the father of the Theory of System, said : *"the system is nothing but the heart of the organic revolution "* (Ref.34). The

difficulty lies in the fact that this scientific question has its foundation in the philosophical presuppositions of science, and therefore requires, from the very beginning, not only an inter- or multi-, but trans-disciplinary approach (*Ref.* 35, inescapable preliminary: the work of Ceausescu). It is now impossible to say that "philosophy is useless".

The symbolic logic is the key which will allow Aboriginal peoples and the Western culture to understand one another. It will be the key to understand the link between traditional knowledge and Western knowledge, these knowledge being scientific as well, with perhaps traditional knowledge having a decisive lead in the matter, by understanding in our everyday life the quantum mechanics, as seen above.

B - What is the relationship between organic thought, IWRM, Sustainable Development (SD) and Resilience?

B1 - The water cycle: science of spatial planning.

The organic thought presented above, provides a basis for dialogue with all the traditional cultures of the world. Indeed, it is a non-dualistic thought which establishes the link between culture and science. It is particularly suited regarding the theme of water, because water has a crucial cultural significance in almost all indigenous cultures. The language of the organic pattern allows to translate in scientific terms their incomparable knowledge, a knowledge which has been nourished by centuries or millennia of experience, from the scale of the quantum to the cosmic scale.

The science of the water cycle, including the precipitation from the sky, the runoff, the evaporation and the evapotranspiration from the plants, the refilling of the groundwater, is integrated into the social rituals of the people, and is simultaneously the science of spatial organization (*Ref.* 03: R. Lambert, 1998). Indeed: each development project has to take in account the flow of water.

After centuries of trial and error, science has now come to a simple formulation of the water cycle (below), which speaks both to the experience of the common man, and to the scientific modeler. The purpose in presenting this scheme is to keep the link between field science (or model-making) with the inhabitants of the concerned territories. The technical as well as the social success of any project depends on it. It is not possible to separate these two dimensions without causing malfunctions, defects of appropriation, misunderstandings which will be detrimental to the sustainability of the structures, to one's everyday life, and ultimately to social cohesion.

The NGOs are required by the UNESCO to disseminate the Pedagogy of the water cycle with an approach which must be clear, simple, scientific all at once, as well as understandable in an almost physical ("bodily") way. IWRM professionals are increasingly using more participatory planning, to allow the passage from indigenous cultural knowledge to a western scientific formalization.

Maude Barlow (*Ref.* 36) establishes a link between deforestation and drought, and between climate change and loss of water resources. She develops the concept of eco societies, a favorite theme at the University of Nancy 2, in a series of key works (*Ref.* 37). In order to achieve her goal, she cites Michael Kravcik. She explains that what is less understood by the public is that our irrespective treatment of fresh water is also a major cause of climate chaos and global warming. This needs to be taken into account. If we want to properly analyze climate change, it is time to include an analysis of how our consumption of water is an additional factor in the apparition of global warming. The solutions to the crisis must include the protection of the water and the restoration of the watersheds.

The Scientific Slovak Michal Kravcik (*Ref.* 36) and his colleagues explain that the living environment influences the climate mainly by regulating the water cycle with huge energy flow associated with it. Plants are subject to evapotranspiration, especially the forests. They work as some kind of biological pump which sucks the humid air of the oceans and forwarding it to dry land. If the vegetation is removed from the ground, the natural system of the regulation of the biosphere is interrupted. The soil is eroded, as a result, the amount of organic matter in the soil is reduced, which in turn reduces its ability to retain water. The dry soil, which has lost its vegetation, traps the solar heat, thus greatly increasing the local temperature and causing a reduction in rainfalls over this region. This process also destroys the natural sequestration of carbon in the soil and causes a loss of carbonaceous material.

Of course, these two ways in which our over-exploitation of water affects climate are deeply linked. Just as the removal of the vegetation of an ecosystem will dry the soil, the removal of the water from an ecosystem will have as a consequence a vegetation which will be reduced or non-existent. As explained by Kravcik, the

yellow of the sun combined with the blue of the water creates the green of our living world. Remove either the blue or the green of the earth, then the sun's heat will change everything.

Taken together, these two factors accelerate the desertification of the planet and intensify global warming

Here is the diagram of the water cycle:

The diagram of the water cycle (Source: Roger Lambert, 1999)

$$P = (Q+E+\Delta R)$$

Rain = amount of surface water evaporation + + Recharge of groundwater

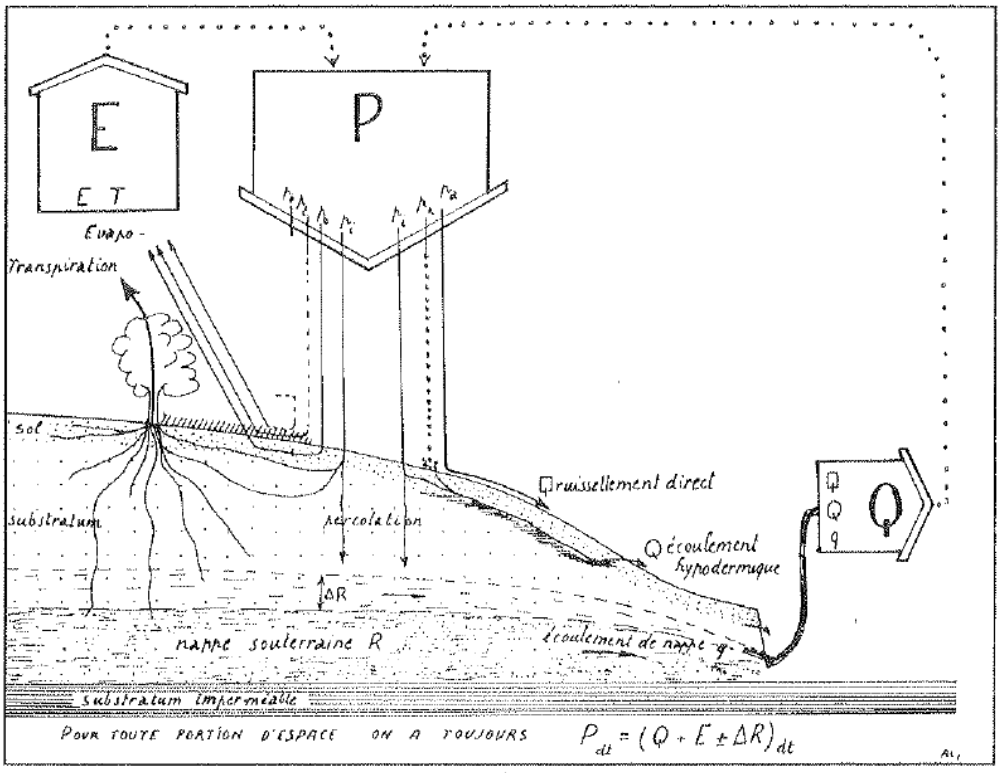


FIG. 2 SCHÉMA DU CYCLE DE L'EAU DANS SES COMPOSANTES CONTINENTALES

Figure 3

B2 - The link between organic thought and the IWRM:

The schematic diagram of the *Integrated Water Resources Management* (IWRM) is described in Figure 4 below.

Almost all statements on water in Africa emphasize the need and the importance of *Integrated Water Resources Management*. This notion has been present in the reflections of the UNESCO since 2000 and the statements of the millennium development goals (MDGs). Successive scientific reports from the UNESCO services (WWDRs WWDRs 1 to 4) have gradually refined this basic concept for all the countries of the world through the variety of situations. IWRM makes it possible to draw a scientific, methodological and conceptual framework which addresses the totality of the contrasting situations in the field.

The reference of the Integrated Water Management is as follows:

http://www.hydrology.nl/ihppublications/169-iwrm-guidelines-at-river-basin-level.html

(So, a link is easy towards all the scientific works of the hydrological section of the UNESCO)

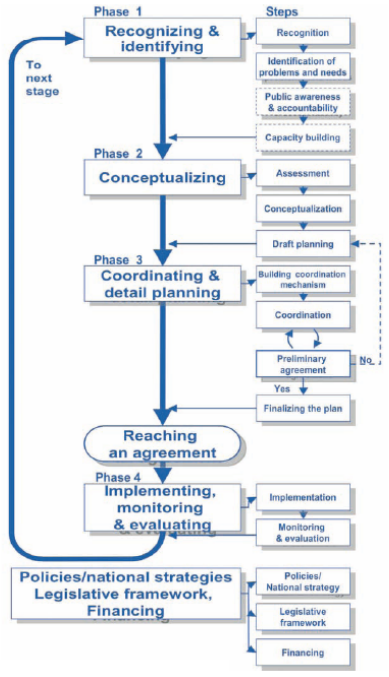


Figure 4

Here, the role of the NGOs is to develop the IWRM with a bottom-up approach, with the politicians or by challenging politicians in different countries.

The NGOs can insist on water as being "source of life", universal law, universal common good ... against predation, privatization, and transformation into a commodity and a financial product.

Figure 4, below, illustrates the methodology of the IWRM developed by UNESCO-IHE in the methodological guide entitled *IWRM Guidelines at River Basin Level* (2010-12) which can be downloaded at the following address:

http://www.hydrology.nl/ihppublications/169-iwrm-guidelines-at-river-basin-level.html

Part 2-1 gives the diagram you can see on the left. It also details each of its phase.

The organic approach applied to water has a strange similarity or resonance with the *Integrated Water Resources Management* of the UNESCO, which has also 5 phases (see figure 4 above). Figure 2 plots the correspondence between the phases detailed in Figure 4 above. There is an amazing match, phase to phase, but is it a coincidence, since both approaches seek to "stick" to the operation of reality as it is? The comparison will enhance the IWRM, in the sense that each phase is reduced to its mechanical dimension (criticism made by many water experts (see *Ref.* 39: ROSE JOHNSTON (Editor), STRANG, 2012):

> « *Practitioners have found with the IWRM a powerful tool to recognize and value ecosystem services associated with river systems and develop management strategies that accommodate human and environmental needs, but its use has also generated considerable criticism over its failure to incorporate lesser-quantifiable values* » (page 16)

At this point, the organic scheme can bring its contribution to the IWRM, illuminating the symbolic mechanisms with visionary intuition, with proposals both cultural and technical, and with processes of decisions both personal and communitarian, all of this with a great scientific rigor.

The interest is to provide a cultural, ontological and cosmological basis for the approach of the UNESCO-IHE, and to expand its applicability in a cross-cultural, cross-disciplinary and multi-scale sense. This goes in accordance with what the UNESCO-IHP wishes (see *Ref.* 39 about the Project on Water and Cultural Diversity of the UNESCO-IHP, and the research on the Right to Water / Human Rights).

A search on this topic could be fruitful for the UNESCO-IHE, but goes beyond the scope of this brief summary. It is now time to focus on the articulation with sustainable development and resilience.

B3 - The link with sustainable development and resilience

Sustainable development tries to articulate economy with environment and society. The Dutch add a fourth element: culture. We can consider here that culture is part of society (and probably also part of the environment if one take into account the indigenous peoples and among them the Aborigines, or the economy if the Westerners are taken into account).

At stake between society and institutions (one of whose component being economy) is the survival of peoples and their political organization, their sovereignty or mode of governance. Vision and vision only drives them forward. This vision is in tune with phase b, VISION.

Traditional, indigenous and Western-style scientific knowledge are to be found between the institutions and the environment. It is *science* in its broad meaning. Science is always a temporary proposal, including for the Western societies (see Karl Popper's principle of refutation). This explains the resonance with phase c, PROPOSAL.

Between environment and society can be found the anchorage of men to their territory, "connection to the territory", "liyan" among the Aborigines and the Nyikina people. This link is clearly state by Jeny Warby and Lucy Marshall, Nyikina leaders, when they say: "*No Water, No People*" (*Ref*. 40). It will be possible to create links with some indigenous peoples in Africa, as is already done by the famous Aboriginal researcher Christine Black with Senegal. One way to express this link is offered by Christine Black in her work *The Land is the Source of the Law* (*Ref*. 41). It has been experimented upon when the Ardennes epic of the 4 Aymon Sons was compared to the ever-present narrative Dream Time of the Ngalyac (the blue tongue snake) at Looma on the Mardoowarra / Fitzroy River, in Kimberley, Western Australia by Philippe Gilbert Vaillant, writer and storyteller (*Ref*. 42). Paddy Roe, an ancient member of the Nyikina People, taught this path, deciphered in 1985 by Stephen Muecke (*Ref*. 43), and experienced in his presence in April 2014 on the Roebuck Bay "songline" near Broome. This link is about social cohesion which determines the acts to be, which resonates with phase d, DETERMINATION or DECISION.

Resilience focuses on the relationship between sovereignty, science and connection to the territory in order allow for an organization of the peoples so that they can cope with climate change, guarantee food security, assume social changes and political decisions. Resilience is what underlies the totality of the links in the diagram, it is the flow which sets in motion all the phases without missing one. Missing one phase might bring on inertia, rupture, regression, or even death. The *drop of experiences* allows us to understand how resilience, when we face a crisis, can be "the ability to resist, to adapt, to respond, to rebound, to rebuild, to self-organize, to return to one's state of equilibrium, to absorb a shock, to change structurally, to sustain oneself, etc. "(*Ref*. 44).

Resilience does not replace sustainable development: it deepens all the links SIMULTANEOUSLY, and prevents sustainable development from being reduced to a division into three sectors (Ref. 25, Congress on Resiliency in Montpellier, May 4-8 2014). In its own way, resilience is a dynamic engine based on values that "binds everything together." Once again, the organic approach can strongly contribute to the definition of resilience, by articulating reality in all its dimensions, from internal relations to external relations, and from the micro to the macro. The door of research on this topic is just slightly ajar.

Mr. Ouattara, JM Koffi Kouadio-Odounfa A., A. Diop-Boare, wondered in their article on resilience in Ivory Coast (Ref. 44) whether resilience was a property or process-state. To this question, we can answer that resilience is both. Indeed, both internal and external relationships are both taken into account. Organic thinking allows, with them, for an in-depth definition of resilience as being "the ability of an individual, a social group, be it biological or socio-ecological, to rebound, to start anew, or be born again, so as to overcome the traumatic consequences of a collision that destroyed all or a part of its integrity. "

From those elements, we can now formulate the following action plan:

B4: A synthetic action plan: a sustainable development plan set in motion by the drop of experiences.

This synthesis process helps give the action an effective operational framework while encouraging comparisons between case studies across Africa and even throughout the world (see the work of Janine Marin, and Réf.45 synthesis in Annex 01, entitled Respected Freshwater, Shared freshwater, Sweetwater finally for all, International Forum "Africa and Water", synthesis of field action analysis presented during the "Africa and Water" Forum, synthesis made using the concept of Whitehead's drop of experiences and presented by Philippe Vaillant (ISOCARP), in March 2004, p 40).

Janine Marin's work gives very concrete examples concerning the interests lying in the organic approach and in the drop of experience. It gathers various case studies which, due to lack of time, have not been reunited herein. Thank you, Janine, for this initiative and this encouragement to act by using the scientific data presented here. This impulsion allows our experiences to be shared and deepened during the Forum and after the Forum.

Thanks to this action plan, science is at the service of the local participation, the local development, the regional development, and the national, continental and global development. Indeed, the process never takes off from practical experience on the ground, from the local experience, the local everyday-life (the "connection to the land," the "liyan" of the Aborigine, and the definition of aboriginal territory). The science which is being discussed here does not separate the mineral, plant, animal and human systems – the local life is seen as a body where everything is interdependent. The interest of the Geographic Information Systems is to properly highlight these interdependencies and to articulate the data from the territory in their social,

cultural, biological, hydrogeological, as well as economic dimension. Some GIS such as QGIS are now royalty free, and allow a development of simple and effective participatory tools.

All the mining, gas and industrial projects can thus be confronted with the real possibilities of the territories, using the following logical approach:

- A study of the region's water limits
- A study of the economic models adapted to these limits
- Establishment of a participatory model in order to chose the model which will be realised.

A model-based approach of this type at the regional level was initiated by Peter Cullen in Northern Australia. It was pursued at the regional studies by CSIRO-NASY and CSIRO-NAWFA following the study by CSIRO Murray-Darling study. It could very well be transposed to tropical Africa and the Sahel in particular. Local models consistent with such regional models are still to be developed in order to provide different partners (the local, regional and national communities, the industry, the farmers, the investors) with the data necessary to undertake development actions in favor of human communities, all this while respecting the environment.

Figure X : Sustainable development moving by the drop of experience

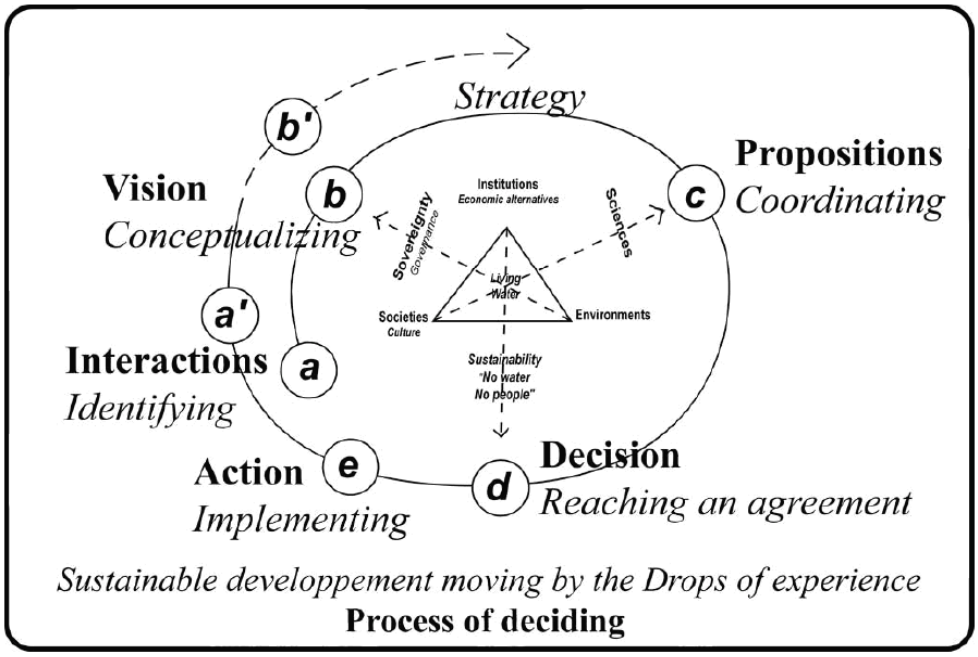


Figure 5: a model for action IWRM: sustainable development set in motion by the *drop of experience*s

Figure 5 offers a fine, simple articulation of the pattern of sustainable development, set in motion by the *drop of experiences*, using the terms of the Integrated Water Resources Management analysis of each of the actions. With this spiral-like method, each level of analysis allows to move from the current situation and the interactions it allows, to a level that broadens the discussion and leads us from vision to action, taking into account the decisions and the proposals which have been theorized by a group whose basic composition is enriched while carrying out a project towards the action this group wants to implement. This method has been developed in collaboration with Nyikina Indigenous People of Kimberley, Western Australia. It can be generalized to the planet.

This method sets in motion real synergies which diversify to answer the requirements and the proposals whose purpose is a universal access to water. It sets in motion beliefs that induce an action which allows "voiceless" peoples to express their views. The file provides examples as the African level, at the state level as well as the region and local levels. The Forum can be the place for various exchanges of experience in order to develop comparisons, transmissions from one place to another, an overall perspective, all of this using the "wide grid" of the *drop of experiences*.

The proposition of a fine-scaled terrain analysis based on Whitehead's drop of experience (described in this file) will enrich one's approach to work, by opening up opportunities for comparative work between different actions, but also - the Forum being international - between actions carried out in different regions, states, or even continents.

C - Organic thinking and action pattern: a contribution to the triple objective of the UNESCO: culture, science and education?

Cultural activities, scientific work and educational activities.

The interest in the UNESCO-NGO Forum is to determine our own definition of the *drop of experiences* in relation to sustainable development and resilience through the theme of water. This definition helps to connect all the key concepts that will be found in the different situations from the field.

Without speaking for the NGOs on the ground, what they have to say will be put in perspective, linked one to the other with a simple frame, which will echo the three areas of expertise of the UNESCO:

- Cultural activities (taking into account the symbolic dimension synthesized in the vision ("the desires and dreams of men" as appearing in human and community meetings)
- Scientific activities (we are referring here to the IWRM, founded on an organic ontology)
- Educational activities (the pattern proposed here will be methodological, pedagogical, didactic, and easy to understand, while allowing for more ingenious developments).

The questions raised by the NGO can follow the steps of the *drop of experiences*, both in terms of education, culture and knowledge (the 3 vocations of UNESCO), as follows:

a - What are the difficulties? Can you give some examples?

b - What is your vision, your dream, what do you want to achieve, even if it seems difficult at the moment? What are you aiming at?

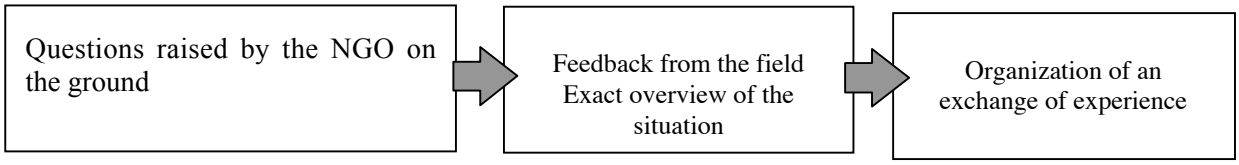
c - What is needed to achieve your vision? What solutions do you propose regarding youth education, cultural practices and water knowledge? Do you have any examples of good practice? Can you give examples of some of the solutions which have been implemented?

d - Who can decide in order to make these solutions? What decision process do you propose?

e - How do you intend to implement these solutions, what must be done?

A basic questioning is thus obtained, which has a maximum generality, a large aperture. It can be the basis for a more precise questioning, notably on education which is the key to knowledge, to what motivates any actions, and ultimately a path of justice towards the construction of a culture of peace.

The strategy could then described as follows:



The case studies compiled by Janine Marin (*Ref*. 45) are a spontaneous work in development, created on her own initiative. They all use this approach, and can help launch a fruitful exchange of experience across the African states, eventually even wider.

D - Status of implementation of the IWRM in Africa?

Two things appeared while this research was being carried out: the importance and the usefulness of two key documents written in part by the UN-UNEP. Those two documents can help to gradually develop a vision of the situation of African countries and the African peoples. These two documents are (Ref. 46):

- 1 - Africa: Atlas of Water, AMCOW, UN-UNEP, USGS, European Union, 2012, 314 p .:

  This document offers a visual overview of the allocations and utilization of water resources in Africa. It includes 224 maps and 104 satellite images, and 500 graphics and hundreds of photos. This Atlas informs synthetically on the progress regarding the commitments made in the context of the African Water Vision 2025.

- 2 – 2012 Progress Report on the implementation of integrated approaches of the management of the water resources in Africa, EUWI, AMCOW, African Union, UNEP-DHI Center, SIWI, Global Water Partnership (GWP), UN-UNEP UN-UNDP, 2012, 90 p.

  This report is based on the data gathered from 40 African countries who responded to a questionnaire submitted by the UN-Water, at the request of the AMCOW.

D1 - The main statements on Water in Africa

Here are the key statements on water in Africa. They are so numerous that it is not possible here to give an exhaustive list, because there are forums at the continental level, or at the level of various regions regrouping several states, or local or cross-border regions. Our goal here is only to initiate a census that can be continued after the Forum, through dialogues and exchanges, in order to follow the wishes expressed in those statements (where there is always a strong place given to the IWRM), and to guide the next declarations in order for the actions to be more effective.

- 1972: RIO and many dates
- 1992 Agenda 21 of the United Nations Conference on Environment and Development (UN-UNCED) / Rio Principles / Dublin Principles
- 2000 African Water Vision 2025 adopted at the 2nd World Water Forum in The Hague.
- 2000 Millennium Development Goals (MDGs)
- 2001: Adoption of the NEPAD by Heads of States and Governments.
- 2001 Kampala Declaration, Uganda: Sector Reform: Water and Sanitation in Africa. Improvement of PPP in the context of the African Water Vision 2025 (supported BM)
- 2002 29-30 April: Abuja Ministerial Declaration on Water (AMCOW Establishment for advancing the vision of the African Union and the objectives of the New Partnership for African Development (NEPAD)). IWRM is a priority.
- February 2004: the Sirte Declaration at the Assembly of the African Union, 2nd Session: Decision on the challenges of integrated and sustainable development of agriculture and water resources in Africa.
- 2007 Johannesburg Declaration: Water for development and the fight against poverty. (INBO; ANBO)
- 2008 the Sirte Declaration at the Ministerial Conference on Water and Agriculture.
- July 2008: Statement of Sharm El-Sheikh of Heads of State and Government of the African Union (the appropriate role of AMCOW to provide strategic leadership in this sector)
- 2012 March 14: Declaration of the Conference on the Initiative for water supply and sanitation in rural areas and the African Water Facility, organized by the Commission of the African Union, and the AMCOW ADB in Marseille.
- 2012: RIO +20
- 2013: International Year of Water
- 2013 Sep 1-6. World Water Week: Stockholm Declaration.
- 2014: World Water Day March 22, 2014

Almost all of the above statements place a strong emphasis on the IWRM.

D2 - Status of the IWRM in Africa in 2012 (UN Report), Global assessment of 40 states and key analyzes.

Various methods of Integrated Water Ressources Management (IWRM) have been developed, especially by the UNESCO-IHE (see ref.5), in order to enable and ensure that governance. Numerous case studies are already given in the reports WWDRs 1-4 (Ref. 47). The case studies cited below focus on Malawi, Mali, Burkina Faso, Senegal, Cameroon, Eritrea and Kenya. A few others are listed in this report (see Janine Marin, Appendix 1), and also by the process of information feedback from the NGOs on the ground. It applies to the various themes dealt with during the Forum.

Assessment of the Integrated Management of Water Resource Management (IWRM) in Africa in 2012 (see ref.1, especially p.60)

The summary of the report is as follows: North Africa is the only sub-region in Africa in which all the countries have implemented the *Integrated Water Resources Management*. The countries of the sub-regions of Southern Africa and West Africa are represented in all three categories (implementation not started, beginning of the implementation, advanced implementation), which provides opportunities for collaborative learning. Many countries in Eastern Africa progressed well, but none is at the stage of advanced implementation. The countries of Central Africa, which benefit from substantial water resources, must be made more aware of the importance of long-term management of water resources.

76% of the participating African countries have national legislation on water and 44% are implementing national plans based on the application of integrated approaches in accordance with "Agenda 21" and the African Vision on Water for 2025

The IWRM

In that context, the role of the NGOs is to develop the IWRM using a bottom-up approach, with politicians or by challenging the policy in different countries. The NGOs can insist on the fact that water is a "source of life," a universal Right, a universal Common Good ... so as to fight against predation, privatization, and its transformation into a market and financial product.

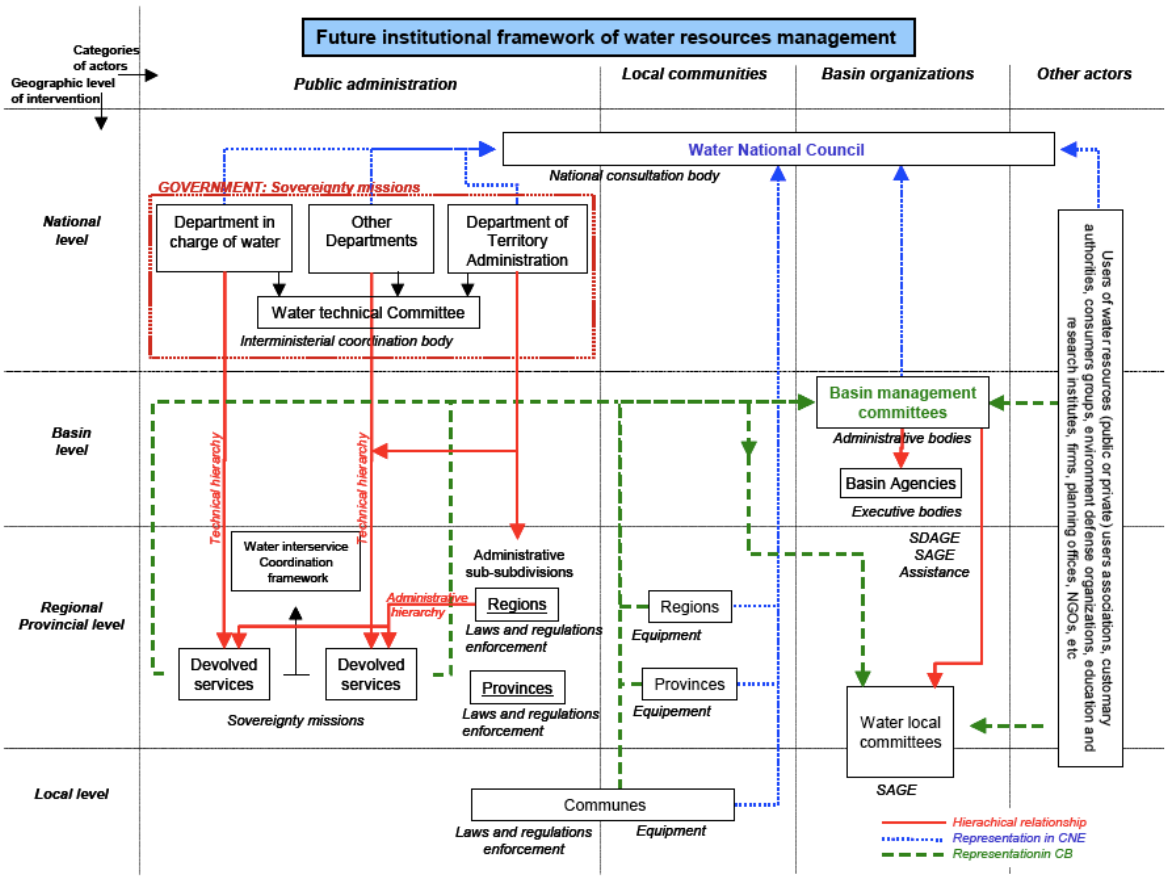
The IWRM in the African countries: some examples.

- Goverment of Malawi, *Integrated Water Ressource Management and Water Efficiency (IWRM/WE) PLAN, 2008-2012*, Abridged version, GWP (Malawi Water Partnership), CIDA, 62p.
- Republic of Mali "*One People - One Goal - One Faith*", Ministry of Energy, Mines and Water, *National Action Plan for Integrated Water Resources Management (Part 1), Inventory of Water Resources and their Management framework, Final Report,* December 2007, 146 p.
- Burkina Faso, Ministry of Agriculture, *Hydraulics and Fishing Resources, Action Plan for Integrated Water Resources Management in Burkina Faso (PAGIRE / IWRM Action Plan),* March 2003, 77p.
- Burkina Faso, *Assessment proposed by AMCOW, drinking water supply and sanitation in Burkina Faso: translate funding into service in 2015 and beyond*, WSP, ADB, AMCOW, UNICEF, 36 per .
- Republic of Senegal "One People - One Goal - One Faith"', Ministry of Water Resources (DGPRE) *Action Plan for Integrated Water Resources Management of the Senegal*, December 2007, 62 p.
- Republic of Senegal, *IWRM, Mid-Term Review*, 2012, 49 p.
- Senegal, *Integrated Water Resources Management and Water Efficiency (IWRM/WE) Implementation Plan, Volume 1 : Main Report (2007-2030),* April 2008, 182 p.
- Partnerships for Africa's Water Development, *Planning for Integrated Water Resources Management and Development in Cameroon,* January 2010, GWP Cameroon, 22p.
- The State of Eritrea Ministry of Land, *Water and environment Water resources Department, Action Plan for Integrated Water Resource Management (IWRM) in Eritrea*, December 2008, 90p.
- Kenya, *Integrated Water Resource Management and Water efficiency, Plan for Kenya*, August 2009, 132 p.

D3 - Importance of multi-scale approaches which include a local participation

A careful reading of a number of IWRM issues shows the predominance of a top/down approach and a lack of bottom/up approaches. Yet, in order for the IWRM to succeed, the participation of the citizens, the local situation and the incorporation of the local culture must be taken into account in the process, as shown by the examples compiled by Janine Marin (Ref. 45). Indeed, why would an NGO build showers in a school which has no water supply? Or, regarding another NGO, what's the point in having computers in a school with no electricity? Etc…

Even an exemplary approach can fail if the local population does not appropriate the project. On the other hand, the local population can provide knowledge, needs, and ideas that will allow various projects to emerge. All this shows that it is important to link the various projects to all the various scales. An example of the kind is presented below, the example of the multiscale IWMR implemented in Burkina Faso:



Action Plan for Integrated Water Resources Management (PAGIRE) – March 2003

D4 - The major threats to water: shale gas, mining, extensive agriculture, dams, extensive irrigation. Main solutions proposed and their effectiveness.

5 threats to water resources:

Each of the 5 threats discussed below would merit a lengthy development. They are the subject of a postdoctoral research which is underway, whose purpose is to separate in the existing date and in cases throughout the world what is disinformation, mere rhetoric used by the industrial-financial lobbying and what can be verified on the field. After months of research, it is now possible to give the following elements:

Shale gas have been extensively used in the States for 10 years now, and it is now possible to make an assessment that informs the choices of other nations. The EPA (Environemental Protection Authority) recognized in 2012 (*Ref.* 48) the environmental damage on a large scale through a series of files to be read carefully before any exploration and fracturing in Africa because moving backwards is not possible once all the groundwater and soil are polluted, and this for the coming hundreds or thousands of years, with serious consequences for health. If these deteriorations are taken into account, the profitability is no longer assured. On the other hand, the profitability of the solutions in renewable energy is ensured, within a positive process for the people (in health, employment, territorialized economy, short supply chains,…) . That the "oil peak" has been reached is now a recognized fact. A transitional model of energy must be invented for each country, for instance by refusing, as France does, the implementation of shale gas).

Mining has already destroyed many territories around the world, and examples of "green mining environment" are hard to find. Thanks to the work of Michel Deshaies at the University of Lorraine, Laboratory Loterr / Cerpa, we can now tackle the basic questions and problem, while waiting to develop criteria to identify the rhetorics which do not correspond to reality, and also indentify the cases where good practices are developped. A conceptual framework must be refined in this direction. (Ref. 07: Deshaies, 2007)

Intensive agriculture produces only one given calorie for a result of only 3 calories. This is to be compared with agrofarming or agroforestry, which for a given calorie produces 25 calories. All of Olivier Sutter's work for the UN (Ref.49) shows therefore that to feed the world population, the solution is not intensive agriculture, but agroforestry and agrofarming. Misinformation on this matter finds its origin in the interests of the multinational societies in selling chemicals and controlling the seeds, with a logic of short-term profits. The interest of the populations is to limit the chemical inputs and develop the varieties which are cultivated, by overlapping the species.

Large dams have proved harmful to the environment, and many of them are currently being decommissioned worldwide. Others are planned. The limits of the environment in Africa seem to indicate that it would be better to focus on micro-dams which would be adapted locally (Ref. 07, Deshaies).

Extensive irrigation is now recognized as being destructive for the territories if careful attention is not given to water consumption in relation to the limits and the requirements of the environment. The example of the Murray-Darling Basin (1,000,000 km2) in Australia and the nearly complete drying-out, during those last 10 years, of the humid areas and the rivers as well as the disappearance of 90% of the biodiversity, all of this led to the hasty and urgent creation of the Muray Darling Basin Agency (MDBA), in order to find a balance by stopping excessive water consumption. Why not rely on this exemplary practice in order to anticipate problems in Africa and other parts of Australia (for instance in the Kimberley and the Caning Basin, both them having the same size)?

Principles of the proposed solutions and their effectiveness

Solutions to energy demand exist in terms of renewable energy. A number of countries have developed relevant scenarios, such as in France, with the Négawatt (*Ref*. 50), the ADEME, the Gaz de France, and the CLER.

E - To go further: data, GIS, groundwater models, and citizenship

E1 - Importance of the data, for further research and action

The documents which have been studied for the elaboration of this project contains data which is often too limited to provide satisfactory conclusions regarding water resources and water management. It is essential to establish local databases which must include the population to the results, even to the collection of the data, in order to benefit from their users' expertise.

E2 - Hydrogeological models and models of citizen participation: a simultaneous and progressive construction

The models include increasingly the connection between groundwater and surface water, which is essential to realize the full cycle of water, described above in section B1.

Conclusion

It is proposed in this file a holistic organic approach that is simple (but not simplified), with a unity of approach which integrates diversity and respects differences through a fairly thin scientific scheme. This scheme is of a universal and evolving nature, because it gradually integrates all the facts. But even considered as a simple method, it is indeed effective if we want to leave, permanently we hope, the logics of the "silo," if we want to articulate all elements of the problems relating to water.

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Ref. 01 : WHITEHEAD, Alfred North, *Process and Reality, An Essay in Cosmology*, Corrected Edition Edited by David Ray Griffin & Donald W. Sherburne, The Free Press, New York, 1978, Paperback edition 1985. French translation Gallimard 1995, et H.Vaillant, inedited.

Ref. 02 : Redstone Statement : *Redstone Declaration of Indigenous Peoples*; See ref. 10. Online at : http://greenfiretimes.com/2010/08/a-declaration-of-the-rights-of-the-peoples-and-the-earth/

Ref. 03 : LAMBERT Roger, *Géographie du cycle de l'eau,* Presses Universitaire du Mirail, Toulouse, 1996, 423 p.

Ref. 04 : Paulo FREIRE, *Pédagogie des opprimés suivi de Conscientisation et révolution*, trad, du brésilien. — Paris, François Maspero, 1974. — 19 cm, 205 p

Ref. 05 : GOLFIER Fabrice, *Transport multi-échelle en milieu poreux : vers un couplage de l'hydrodynamique aux processus biophysico-chimiques*, Mémoire pour l'obtention de l'Habilitation à Diriger des Recherches, ENSG-INPL (Nancy Université) Laboratoire Environnement, Géomécanique et Ouvrages (LaEGO), dec. 2011, 90 p. Pour la question d'approche multi-echelle, voir page 23 et 24 (pdf 25-26).

Ref. 06 : HUSSON Jean-Pierre, *Envies de campagne : les territoire ruraux français*, Ellipses, Paris, 207 p., See multiscale question p.3, 25, 115, 122, 126.

Ref. 07 : DESHAIES Michel, *Les territoires miniers, Exploitation et reconquête*, Ellipses, 2007, 224 p. so as DESHAIES Michel, & BAUDELLE Guy, *Ressources naturelles et peuplement*, Ellipses, 2013,

Ref. 08 : SHERBURNE Donald W., 1966, *A key to Whitehead's Process and Reality,* TheMacmillan Company, 263 p. Quote Glossary p.205. The major work of A.N. Whitehead is *Process and Reality. An essay in cosmology, corrected Edition*, Edited by David Ray Griffin and Donald W.Sherburne, 1978 (Original printed in 1929), 413 p. (Abbreviation PR, followed by the paragraph number from a to z).

Ref. 09 : GRIFFIN David Ray, 1998, *Unsnarling the World-Knot : Consciousness, Freedom, and the mindbody Problem*, Berkeley & Los Angeles: University of California Press,. Being translated into Chinese.Trad H. Vaillant, *Démêler le noeud du monde, Conscience, Liberté et le problème de l'Esprit et du Corps*, (DNM), Avril 2003 (inédite). See chapter 3 to 5 for the "hard core of common sense".

"Whatever is found "in practice" must lie within the scope of the metaphysical description. When the description fails to include the practice, the metaphysics is inadequate and requires revision".(W. PR 13 b)

Ref. 10 : VAILLANT Philippe, 2008, *Territorial experience enlightened by A.N. Whitehead Thought: Convivial regions' potentiality and applications to the region "between the Vosges and Ardennes"*, 611 p. Online at following address :

http://docnum.univ-lorraine.fr/public/DDOC_T_2008_NAN21_019_VAILLANT.pdf

The 15 steps analyzed are: the educational training organization Personality and Human Relations (PRH) and the Association "Men and Women in the City" (HFC Brainville-sur-Meuse) tool, approach to local development Bernard Vachon, proposals for the territory of the Foundation for Human Progress (FPH, Paris), PhD William Twitchett, 42nd Congress ISOCARP 1997 thesis Patrice BRACONNIER, work of Guy DI MEO & Pascal BULEON, work Rodrigo Vidal-ROJAS, Jacques de Courson, Marie-Claude MALHOMME Pierre Sansot Eric DARDEL Augustine BERQUE, AITF.

Ref. 11 : These are the following eight steps, which are the subject of a doctoral work in progress for the year 2014:

- No. 16: the theological approach of Louis-Marie Chauvet in *Symbol and Sacraments* (Professor for 40 years of sacramental theology at the Catholic University of Paris), see Annex 05.
- No. 17: *The management of complex projects* Etienne Roy and Guy Vernelet,
- No. 18: IWRM Integrated Resource -Manage Eau UNESCO-IHE (English IWRM Integrated Water Resource Management).
- No. 19: Peter Checkland, HOLWELL Sur, *Information, Systems and Information Systems: making sense of the field,* Wiley, 2005 (1998), 262 pages, diagrams see page 102 & 205 short, complete page 106 and 147.
- No. 20: Bent Flyvbjerg, *Making Social Science Matter. Why social inquiry fails and how it can succeed again*, Cambridge, 2001, 202 p.
- No. 21: *Facilitator's Guide Manual for native water planning* Track-NAILSMA1 2012
- *Facilitators'Guide to Indigenous Water Planning, Handbook*, Track, NAILSMA (Tropical Rivers and Coastal Knowledge, and North Australian Indigenous Land and Sea Management), 2012, 30 p.
- No. 22: DENISSSON William C., *Integrating and Applying Science, a practical handbook for effective coastal ecosystem assessment*, Edited by Longstaff BJ, Carruthers TJB, Dennison WC, Lookingbill TR, Hawkey JM,

Thomas JE, Wicks EC, Woerner J. , 2010 IAN Press, Cambridge, Maryland (University of Maryland Center for Environmental Science -UMCES-)

- No. 23: 2005_M-Keen, VA Brown, R-Dyball-Social Learning in Environmental Management. Building a sustainable future, Earthscan, London, 281p (3 DVDn See the full text) & David KOLB. Experiential Learning. Experience as The Source of Learning and Development, Prentice-Hall, Inc. Englewood Cliffs, New Jersey, 1984, 38p. (See DVDn 3 full text)*Ref.* 12a : BRACONNIER Patrice, 2005, Un processus de gouvernance dans le sens du développement territorial, PhD, Poitiers, France, 320 pp. et aussi

BRACONNIER Patrice, 2011, RUESS, *Quelles spécificités de compétences et de formation en ESS ?* , 32 p. Online at: http://www.riuess.org/index.php?option=com_docman&task=doc_download&gid=79&Itemid=.

Ref. 12b : GRIFFIN David Ray, 1998, *Unsnarling the World-Knot : Consciousness, Freedom, and the mindbody Problem*, Berkeley & Los Angeles: University of California Press,. Being translated into Chinese. Trad H. Vaillant, *Démêler le noeud du monde, Conscience, Liberté et le problème de l'Esprit et du Corps*, (DNM), Avril 2003 (inédite). See chapter 3 to 5 for the "hard core of common sense".

"Whatever is found "in practice" must lie within the scope of the metaphysical description. When the description fails to include the practice, the metaphysics is inadequate and requires revision".(W. PR 13 b)

Ref. 13 : DEBAISE Didier, *Un empirisme spéculatif, Lecture de Procès et Réalité de Whitehead*, Vrin Paris, 2006, 192 p.

Ref. 14 : JAMES William, *Essais d'empirisme radical*. Richard Shusterman. Henry et William James. 1901. (Ph. DE). Éditions Agone

Ref. 15 : WEBER Michel, 2003, *La dialectique de l'intuition chez A.N. Whitehead. Introduction à la lecture de Procès et réalité,* Ontos Verlag,

Ref. 16 : STENGERS Isabelle, PRIGOGYNE Ilya, 1983, *La Nouvelle Alliance*, Folio, Essais , Paris, 439 p. & . STENGERS Isabelle, 2002, *Penser avec Whitehead : une libre et sauvage création de concepts,* Seuil, Paris, 582 p.

Ref. 17 : DUMONCEL Jean-Claude, *Le système de Whitehead et la philosophie analytique*, Thèse pour le doctorat de philosophie, Université de Nantes, 1986, 753 p. En cours de publication.

Ref. 18 : GRIFFIN David Ray, 1993, COBB John B., MARCUS JR, FORD PP., PETE A., GUNTER Y., OCHS Peter, *Founders of constructive postmodern philosophy : Peirce, James, Bergson, Whitehead and Hartshorne,* Albany: State University of New York Press,.

Ref. 19 : Teilhard de Chardin called *grain of thought* which corresponds to the *drops of experiences* Whitehead. He describes his *grain of thought* in his major scientific work follows:

TEILHARD DE CHARDIN, *Le phénomène humain,* Le Seuil, Paris, 1955, 318 p. English translation: *The Human Phenomenon* (1999), Brighton: Sussex Academic, 2003

Ref. 20 : voir notamment RUYER Raymond, *Éléments de psycho-biologie* Presses Universitaires de France, Paris, 1946

Ref. 21 : RESHER Nicolaq, *Essai sur les fondements de l'ontologie du procès*, traduction de l'anglais et interprtation par Michel Weber, Ontos Verlag, Heusenstamm & Paris, 2006, 262 p.

Ref. 22 : WEBER Michel and DESMOND William, Jr (Eds), *Handbook of Whiteheadian Process Thought*, Ontos Verlag, Frankfurt, Paris, 2008, Volume 1, 691 p., et volume 2, 715 p.

Ref. 23: 49th ISOCARP Congress in Brisbane in October 2013: "Frontiers of planning: developments and declines» http://www.isocarp.org/index.php?id=1561#c3978 et ma présentation à : http://www.eventure-online.com/eventure/publicAbstractView.do?id=226889&congressId=7180

http://www.eventure-online.com/parthen-uploads/95/13BRI/add226889_QuxYtgt1Wf.pdf

Ref. 24: Peace Conference Armidale from 13 to 15 October 2013 View on Internet: http://www.une.edu.au/about-une/academic-schools/school-of-humanities/news-and-events/peace-studies-conference. Intervention de P.Vaillant à l'adresse suivante : http://www.une.edu.au/about-une/academic-schools/school-of-humanities/news-and-events/peace-studies-conference/conference-presentation-recordings

Ref. 25: Conference on Resilience in Montpellier from 4 to 8 May 2014 http://www.resilience2014.org/outputs-outcomes/ppt-presentations Intervention à l'adresse suivante : https://drive.google.com/folderview?id=0B3CTvjSxBMlMdk0xS3hzVFMtTUU&usp=drive_web&tid=0B3CTvjSxBMlMbmcybGhPbVNoMGs

Ref. 26 : UNESCO-IHE , GIRE *IWRM Guidelines at River Basin Level* (2010-12) Accès Internet :

http://www.hydrology.nl/ihppublications/169-iwrm-guidelines-at-river-basin-level.html

Ref. 27: This is the first trilogy Whitehead:

CN *The Concept of Nature,* Cambridge UP, Cambridge, 1920.
(**CN**) *Le Concept de Nature* *, Tarner Lectures 1919.
Traduction par Jean Douchement, Vrin, Paris, 1998.
Traduction également par H.Vaillant, inédite

PNK An Enquiry Concerning the Principles of Natural Knowledge, Cambridge UP, Cambridge, 191
(PCN) Une Enquête sur les Principes de la Connaissance Naturelle *,
traduction H.Vaillant, Éditions Chromatica, Bruxelles, 2007, 281 pp.

PRel Principe de Relativité

Ref. 28: This is the second trilogy Whitehead:

SMW Science and the Modern World, 1925, Free Press, New York, 1967.
(SMM) La science et le Monde Moderne *, Lowell lectures 1925,
traduction H.Vaillant, Éditions Ontos Verlag, Heusenstamm, 2005

PR Process and Reality, 1929. Corrected Edition,
Ed. David Ray Griffin and Donald Sherburne, Free Press, New York, 1978,
(PR) Procès et réalité *,

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(AI) Aventure d'Idées *, 1933.
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Ref. 36:. On October 14, 2008, at the UN, Miguel d'Escoto Brockmann named Maude Barlow, Senior Advisor to the President of the Assembly for water issues

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Ref. 38 : Michal Kravcík (born 3 February 1956) is a Slovak hydrologist and environmentalist. He was awarded the Goldman Environmental Prize in 1999, for his contributions to the water management of the Torysa River

Ref. 39 : ROSE JOHNSTON Barbara (Editor in Chiel), *Water, Cultural Diversity, and Global Environmental Change : Emerging Trends, Sustainable Fuiures ?* , Editorial Board : HIWASAKI Lisa, KLAVER Irene J., RAMOS CASTILLO Ameyeli, STRANG Veronica, Springer, UNESCO-IHE, 2012, 560 p.

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Ref. 44 : CHATAIGNIER Jean-Marc (sous la direction de), *Fragilités et résilience, les nouvelles frontières de la mondialisation,* Editions Khartala, Paris, 2014, 482 p. Voir l'article de M.Ouattara, JM Koffi, A. Kouadio-Odounfa, A.Diop-Boare intitulé **« La résilience en Côte d'Ivoire : éléments d'observation et d'analyse »,** pages 371-383.

Ref. 45 : MARIN Janine, *Eau douce respectée, Eau douce partagée, Eau douce enfin pour tous, Forum International « Afrique et Eau », Synthèse des analyses d'actions de terrain dans le cadre du Forum « Afrique et Eau », réalisée à partir de la goutte d'expérience de Whitehead présentée par Philippe Vaillant* (ISOCARP), Mars 2004, 40 p

Ref. 46: The two key documents summarizing Africa and water :

> *1 Africa Water Atlas,* AMCOW, UN-UNEP, USGS, European Union, 2012, 314 p .: This is a visual overview of the allocations and utilization of water resources in Africa through 224 maps and 104 satellite images, and 500 graphics and hundreds of photos. This Atlas informs synthetically on the progress of commitments made in the context of the African Water Vision 2025.
>
> *2 Progress Report 2012 on the implementation of integrated approaches to the management of water resources in Africa,* EUWI, AMCOW, African Union, UNEP-DHI Center, SIWI, Global Water Partnership (GWP), UN-UNEP, UN -UNDP, 2012, 90 p. This report is based on data gathered from 40 African countries who responded to a questionnaire submitted by UN-Water, at the request of AMCOW

Ref. 47 : WWDR3 WWAP (Programme des Nations Unies pour l'évaluation des ressources en eau). 2009a. 3e Rapport des Nations Unies sur la mise en valeur des ressources en eau l'eau dans un monde qui change. Paris, UNESCO et Londres, Earthscan.

WWDR4 WWAP (United Nations Programme for the assessment of water resources). 2012, The United Nation World Water Development Report 4 : *Managing Water under Uncertainty and Risk* (vol.1), *Knowledge Base* (vol.2), *Facing the challenges* (vol.3), Paris, UNESCO. UNESCO Publishing : http ://publishing.unesco.org/,

Ref. 48 : EPA/601/R-12/011, REPORT US Environmental Protection Agency Office of Research and Development Washington, *Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources* PROGRESS, DC December 2012

To complete :

SUMI Lisa, OIL AND GAS ACCOUNTABILITY PROJECT, OUR DRINKING WATER AT RISK *What EPA and the Oil And Gas Industry Don't Want Us to Know About Hydraulic Fracturing*, www.ogap.org, 2012, 71 p.

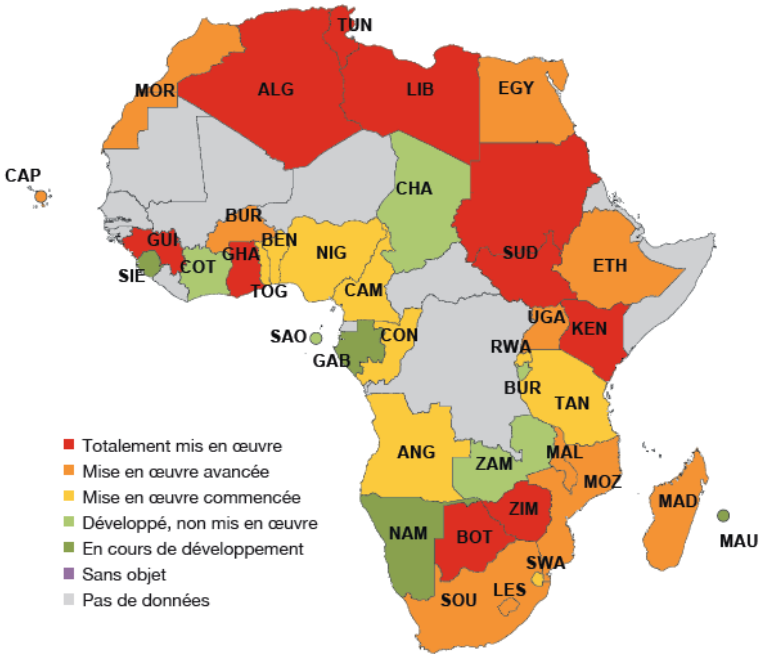
Ref. 49 : DE SCHUTTER Olivier, Special UN Rapporteur on the Right to Food. See his work on:

http://www.srfood.org/fr
http://fr.wikipedia.org/wiki/Olivier_De_Schutter
http://www.srfood.org/fr/rapports-publies

Ref. 50 : See also Négawatt scenarios on http://www.negawatt.org/le-scenario-negawatt-pb14.html

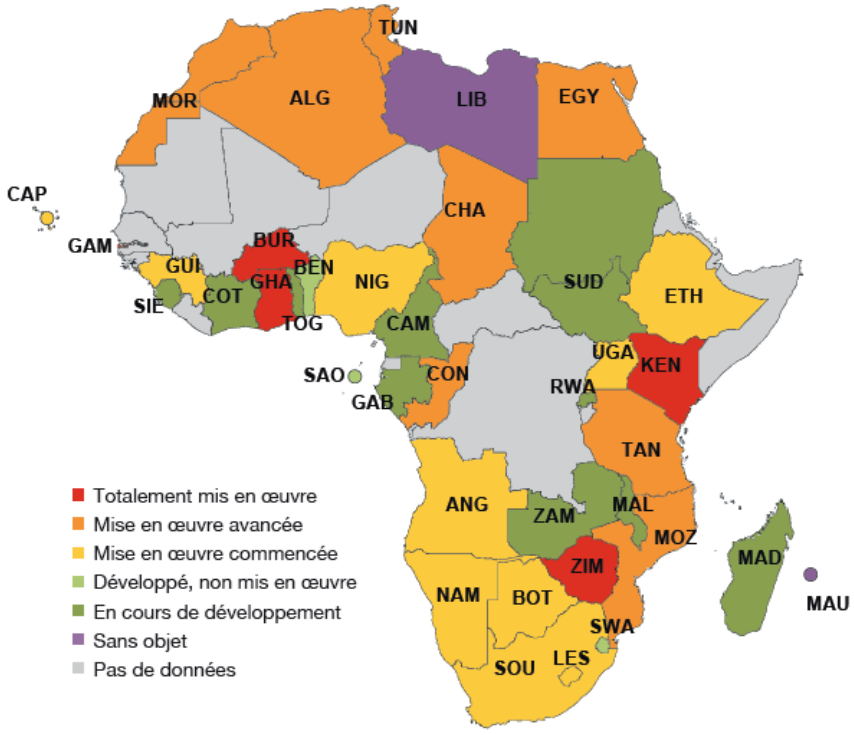
ANNEXE 01 : Les progrès en matière de GIRE et en matière de gestion décentralisée des ressources en eau en Afrique en 2012, extraits du *Rapport de situation de 2012 sur l'application des approches intégrées de la gestion des ressources en eau en Afrique*, EUWI, AMCOW, African Union, UNEP-DHI Center, SIWI, Global Water Partnership (GWP), ONU-PNUE, ONU-PNUD, 2012, 90 p

FIGURE 2.4 Progrès accomplis en termes d'élaboration et de mise en œuvre d'une législation relative à l'eau. (Question 1.1c)



Planification de la GIRE : De nombreux pays ont indiqué qu'ils avaient mis en œuvre des programmes visant à élaborer des plans de GIRE depuis le sommet de Johannesburg (qui préconisait le développement de tels plans de gestion)[13]. D'après les résultats de l'enquête, des plans de GIRE ont été mis en œuvre dans 18 pays (44 pour cent), et sont parfaitement opérationnels pour 3 d'entre eux (Figure 2.5). Seul un pays ne se sent pas concerné par les plans de GIRE. Les autres pays ont des plans en cours d'élaboration ou attendent que ceux-ci soient approuvés. L'adoption et la mise en œuvre de plans de GIRE varient considérablement à l'échelle sous-régionale. Les taux de mise en œuvre les plus élevés concernent l'Afrique du Nord et l'Afrique de l'Est, et l'Afrique Centrale a enregistré les taux les plus bas. Il est

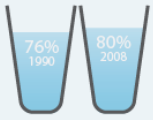
FIGURE 3.1 Progrès accomplis en termes de gestion décentralisée des ressources en eau. Mécanismes pour la gestion des bassins fluviaux. (Question 2.1a)



Annexe 02 : Comparaison de quelques pays de l'Afrique de l'ouest, extraits de l'Atlas de l'Afrique, *Afrique : Atlas de l'Eau*, AMCOW, ONU-UNEP, USGS, Union Européenne, 2012, 314 p.

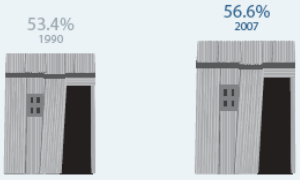
PROGRESS TOWARDS MDG GOAL 7

Water pollution is a significant environmental problem in Côte d'Ivoire due to chemical waste from agricultural, industrial and mining sources. The proportion of the population using improved drinking water sources increased slightly in both urban and rural areas, however, with an average from 76 per cent in 1990 to 80 per cent in 2008. The overall proportion of the population using improved sanitation facilities also rose marginally, from 20 per cent in 1990 to 23 per cent in 2008, with an increase from 8 to 11 per cent in rural areas and a slight decrease in urban access, from 38 to 36 per cent.



Proportion of total population using improved drinking water sources, percentage

Proportion of total population using sanitation facilities, percentage

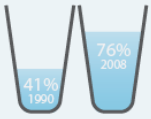


Slum population as percentage of urban

COTE D'IVOIRE

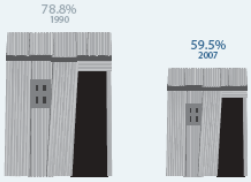
PROGRESS TOWARDS MDG GOAL 7

Much of Burkina Faso lies within the Sahel where droughts and floods are becoming longer and more intense. People abandoning rain-fed agriculture are moving to peri-urban areas where investment in improved water and sanitation is low. It has made good progress in improved water coverage: from 73 to 95 per cent, and from 36 to 72 per cent in urban and rural areas, respectively, from 1990 to 2008. Improved sanitation coverage is much lower: 33 per cent in urban and 6 per cent in rural areas in 2008.



Proportion of total population using improved drinking water sources, percentage

Proportion of total population using sanitation facilities, percentage

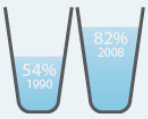


Slum population as percentage of urban

BURKINA FASO

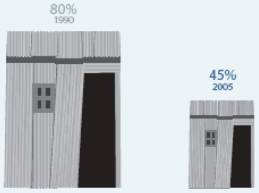
PROGRESS TOWARDS MDG GOAL 7

Water provision reforms have achieved remarkable progress in Ghana, with an increase from 54 per cent in 1990 (84 in urban areas and 37 per cent in rural) to 80 per cent in 2008 (90 per cent in urban and 74 per cent in rural areas). The MDG target is for 85 per cent. Improved sanitation access lags far behind due to a lack of local capacity and funding. In 2008, only 13 per cent of the total population had access; the MDG target is for 80 per cent.



Proportion of total population using improved drinking water sources, percentage

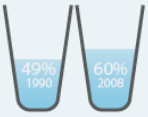
Proportion of total population using sanitation facilities, percentage



Slum population as percentage of urban

PROGRESS TOWARDS MDG GOAL 7

Togo has a humid, tropical climate, but receives less rainfall than most of the other countries along the Gulf of Guinea. Between 1990 and 2008, the proportion of people with access to improved drinking water increased from 49 per cent to 60 per cent. Access in urban and rural populations rose from 79 to 87 per cent and 36 to 41 per cent, respectively. The percentage of people using improved sanitation facilities, however, declined from 13 to 12 per cent in the same period. Urban use dropped from 25 per cent to 24 per cent and rural use dropped from 8 per cent to 3 per cent.



Proportion of total population using improved drinking water sources, percentage

Proportion of total population using sanitation facilities, percentage

Slum population as percentage of urban

GHANA ***TOGO***