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Urban Hydro-Sociology: analysis of the mutual care between waters and citizenship in Brazil

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Abstract


To do research about water is like doing about life: everything fits inside that field. To choose an approach facing the amplitude of this topic is mandatory for this kind of research, for that reason neologism 'Hydro-Sociology' is proposed as a methodological tool (a mirror showing reciprocity issues) to apply the scientific philosophy of the experimental phenomenology to a 150 km², highly urbanized microbasin through a qualitative, quantitative indicator. The research discuss that reciprocity through the analysis of the mutual care between water and citizenship at *Riberão das Anhumas* microbasin in Brazil, with a methodology based on a phenomenological reflection on the urban indicator 'Water Footprint' and its applicability in the case study, disserting about the archetypical "matter of life and health" aided from the wise sight of transdisciplinary thinker-actors.

Keywords

Hydro-Sociology; citizenship; reciprocity; waters; water footprint

INTRODUCTION

In his biological-urban approach and together with the idea of reciprocity through an economic interpretation of history, criticizing both orthodox and socialist interpretations from an evolutionary one, Scottish biologist and urban planner Patrick Geddes first named the term 'social basin', at a conference spoken in 1923 at the New School of Social Research of New York entitled "The valley section from hills to sea". There he stated (GEDDES, 1959), in an innovative sight on evolutionary biology, that throughout generations the landscape we transform do transforms us, that we are cultivated by our agriculture (farming habits), as differs the oriental rice-culture from the occidental corn-culture. Following this reasoning, can we think that we are domesticated by our cattle, bodily shaped by our chairs and car seats and, why not, qualified by the water we manage and the social ways we do? This paper, throwing an incipient thesis onto public discussion, discourses on it.

The case study centers on the microbasin framework. After a survey on Water Footprint indicator through reflective thought (reciprocity), 2 aspects will be integrated into the methodology prior applying it on the microbasin as an experimental indicator: (a) qualitative issues and (b) a 'Urban Water Footprint' (real estates as immovable goods). Reciprocity travels from the obvious to the fascinating, in the analogous path that Andrei Tarkovsky crossed from typical to unique in his film works, explicitly explained in 1987 in "Sculpting in time". Reciprocity is symbolized with  in the thinking-acting figures below.

MATERIAL & METHODS

To study the reciprocity embedded inside the mutual care between waters and citizenship in Brazil, 2 materials and a two-phase method are selected: as the research **materials**, is used the Water Footprint indicator as the main matter researched (the object being reflected on), and the Brazilian Anhumas Project as specific field study from where data is recycled and collected; for the **method**, a first phase reflects on the water footprint indicator through experimental phenomenology, a second one applies an experimental indicator on the Anhumas microbasin (case study) through experimental mathematical and cartographical tools based on a Water Footprint indicator qualitative checking.

Water Footprint indicator is the main matter researched, the object being reflected on. It is a geographically explicit indicator about the water use embedded in goods and services production and relates to global trade, that in theory synthesizes quantitative and qualitative information but in practice has a lack of transdisciplinary reflection because of being in an incipient consolidation process. It was elaborated from the virtual-water concept calculation methodology (ALLAN, 1998) focused on commercial and geopolitical issues, so it opens a field to research its sense and operativity in social, political water management topics.

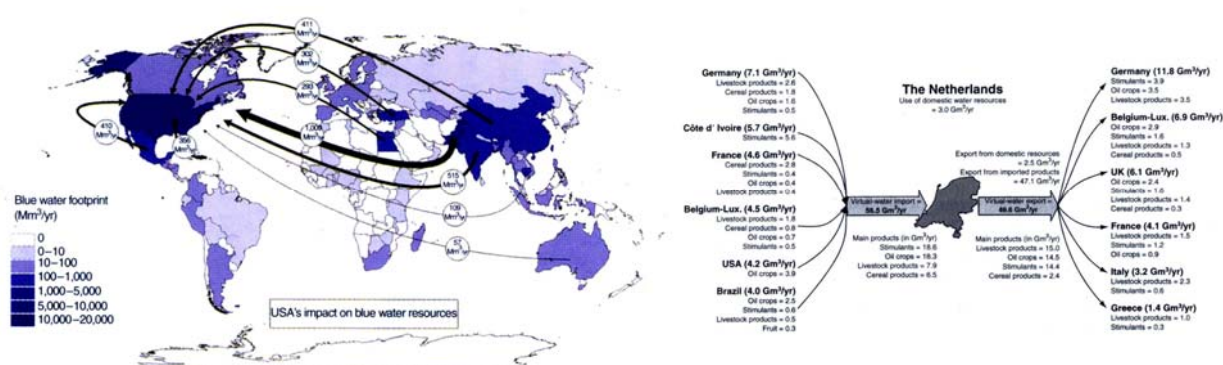


Figure 1: On the left, map showing USA Blue water footprint, showing the impact of USA consumption habits on world superficial freshwater and groundwater resources; on the right, virtual-water balance of The Netherlands related to crop trade. Data for the period 1997-2001. Source: Hoekstra & Chapagain, 2008.

The **Anhumas Project** is the specific field study from where data is recycled and collected. With its complete name “Environmental Restoration, Participation and Public Power: an Experience at Campinas City” and developed in Brazil between 2000-2006, this reference project (COSTA et al., 2006) was a detailing study of the use and occupation of *Riberão das Anhumas* microbasin lands, the economic and social diagnostic and the construction of an environmental education program, focusing on the promotion of actions that lead a formation of critic citizens, active and conscious of their role in the environmental management of the urbanized river landscape. The institutions involved were *Instituto Agrônomo de Campinas* (IAC), *Universidade Estadual de Campinas*, *Prefeitura Municipal de Campinas* (PMC), *Instituto Florestal* (IF) and *Universidade de Brasília*, and was economically supported by Brazilian research agency FAPESP.

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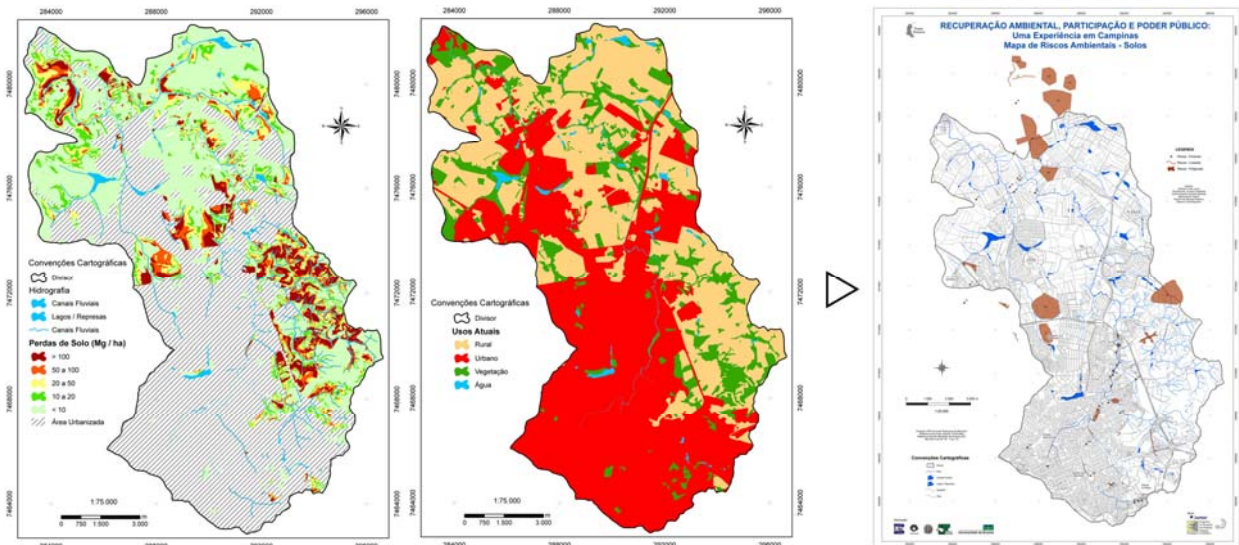


Figure 2: Erosion risk compound maps at Riberão das Anhumas microbasin. Source: Anhumas Project.

The first phase in methodology is a reflection on the water footprint indicator through **experimental phenomenology (reflective philosophy)**. It represents not just an alternative scientific sight, but an ontological and epistemological shift, named through the neologism ‘Hydro-Sociology’. Aspects of the phenomenology of waters will inform the research, from the archetypical waters, the sanitary politics of Chadwick and the lost circularity (ILLICH, 1998) and the insights of Saint-Simon and the ‘tap water utopia’ (VARGAS LLOSA, 2002).

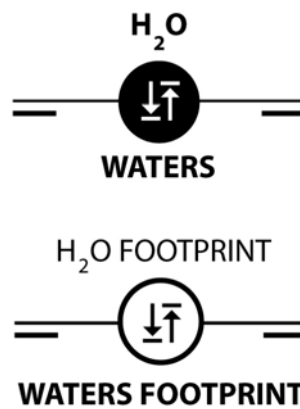


Figure 3: Thinking-acting model showing the reflective, phenomenological shift.

The second phase in methodology is an application of an experimental indicator on the Anhumas microbasin case study through integrated mathematical and cartographical tools based on **Water Footprint qualitative checking**. It will be integrated a proposed ‘Urban Water Footprint’ (immovable consumption goods) from the methodology by McCORMACK et al., (2007) and qualitative issues from ARROJO (2006) insights will be inserted. Cartography based on Sankey diagrams and ecosystem modeling from Odum’s models will be presented using an algorithmic design tool in order to show complex data in a more understandable way.

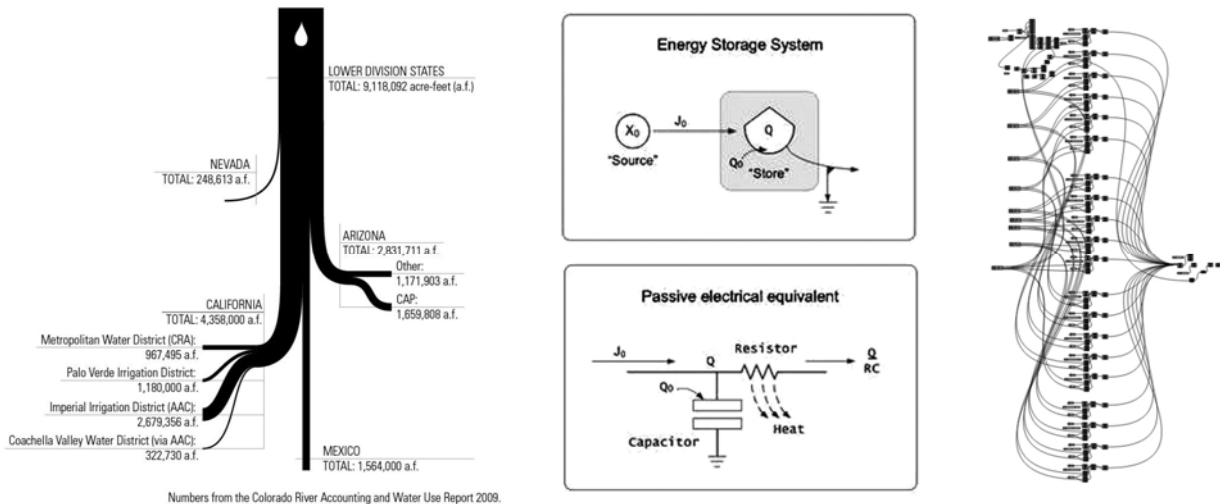


Figure 4: From left to right, Sankey diagrams of Colorado basin water use, Odum's system modeling and interface for an algorithmic design by Grasshopper®.

The framework selected is the 'environmental basin', term named and developed by a Brazilian biologist working on territorial matters, where Odum's modeling is applied to this geographical matrix (model C from figure 5). As explained in her PhD thesis (RUTKOWSKI, 1999): *the present work discusses the 'metropolitanized' freshwater management in Brazil and proposes a new strategic environmental planning unit — the environmental basin. It is a process with dynamic boundaries defined by social and ecological indicators under the perspective of the development's sustainability. It aims to induce a differentiated participation of all segments of society.*

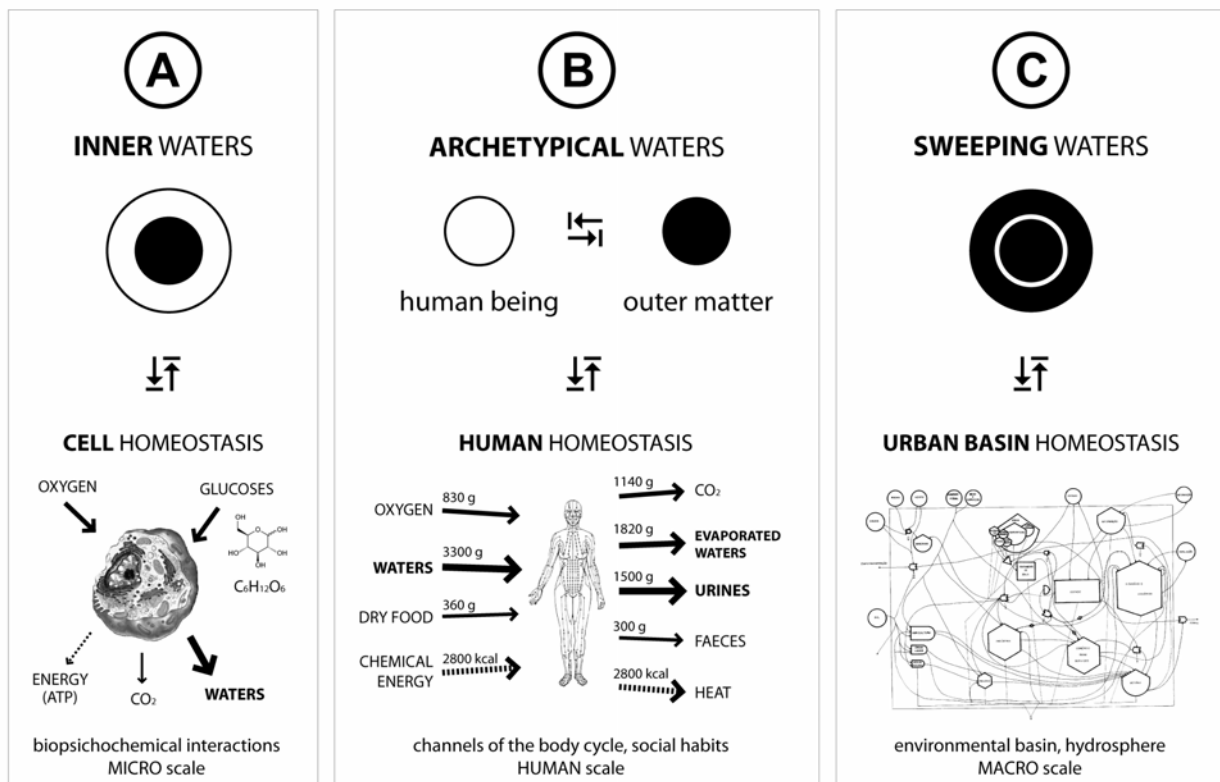


Figure 5: Types of waters according to its phenomenological reconnaissance and analogies with homeostasis, where black circles represent the waters and white circles the human being: (A) inside the human body, (B) outer, discreet and visible, and (C) surround, diffuse and hidden.

RESULTS AND DISCUSSION

It will be presented an advance of the main results of applying that experimental indicator in order to discuss the mutual care between waters and citizenship in Brazil from analytical data and disciplinary tools.

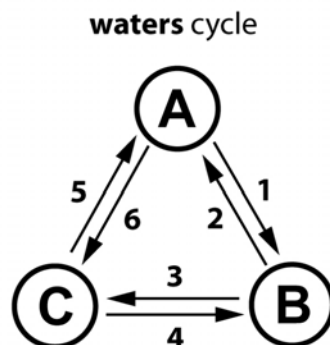


Figure 6: Thinking-acting model showing the waters cycle and its mutual processes among types.

Reciprocal processes of the *waters cycle*: (A) homeostasis; (B) visible hydrological cycle; (C) hidden hydrological cycle and climate; (1) wasted waters from the human catabolism (sweat, tears, breathing exhalation, urine); (2) fresh waters for human metabolism, breathed vapours and waters embedded in foods; (3) infiltration and evaporation processes; (4) rainfall, spring rising; (5) amniotic liquid, sub aquatic immersion, skin permeability, body humors; (6) aqueous humor, radiestesy.

In the **discussion** encouraged, the wider trend expected from the research results relies on practical reflections on the Water Footprint indicator. The Spanish research group, mentioned below, reflects on it through an ‘Extended Water Footprint’ referring to an integration of hydrological and economic calculations showing a more objective and transparent sight, reflecting on the “hydromith” of global water scarcity and the lacks of Falkenmark Index suffering from a “lack of complexity and sophistication” (LLAMAS et al., 2009). The most important aspect revealed from the point of view of the management of a scarce resource, was that most part of water uses produces crops with very low economic value, high irrigation demand and that represents one of the biggest causes for diffuse contamination.

The lack of qualitative calculations links to the following issues related to politics and ecological insights (TOLOSA, 2009): (a) water scarcity is a new myth when we talk about ecosystem dynamics, (b) promoting international trade means rising energetic and ecological footprint, (c) the change of the price in basic foods causes hunger troubles in areas where governments speculate with traded crops (Mexico case).

Moving our sight to complementary fields can widen research on urban waters, as we know about archetypal waters as universal contentless forms that channel experiences and emotions (JUNG, 1981) or issues like the ethical imperative about sustainability in the professional and citizen water management practices (ARROJO, 2006). One of the points of interest relays on the instrumentalization of the conditions of homeostasis (CANNON, 1963) and the conditions needed for the autopoiesis (VARELA et al., 2004) for urban waters policies.

Would it be possible that those different qualities affect the elemental homeostatic processes, as in the basic biochemical equation $C_6H_{12}O_6 + 6 O_2 \rightarrow 6 CO_2 + 6 H_2O + e$? Do exist different glucose types according to its different water molecules and do we produce in our bodies watery fluids different in quality? And how this fact would affect health, cognition and evolutionary

issues? Probably this will have to be answered in deep collaboration with researchers from biochemistry, psychiatry and somatic psychology.

CONCLUSIONS

Including qualitative issues into urban water management would shift that research and praxis towards key social, political matters. From the previous reflections, we could accept there is a need for a paradigm shifting, involving compulsorily urban waters management. We have to remember that from the last 80's, city's care lives between two referential frameworks: one based on the evolution as innovation from necessity and misery (Darwinian, Neo-Malthusian) and other based on innovation from the prime of society (Marxist). Disenchantment and decline of cities and sustainability disarray demand pointing efforts to renew approximations towards urban reality. Due to accelerated changes, uncertainty leaves ironically obsolete any aim to give sense to reality before it is practiced and is effective. So the standardized determination of people occupied with the city's care (city planner and architect profession), with its transmission (teaching) and its improvement (research) has an unbalanced theoretical framework of reference. Expected praxis-oriented reflection on Water Footprint indicator can reveal that there are significant deficiencies within the concept of virtual-water meaning that there is a significant risk in relying on these measures to guide policy conclusions. The recent pioneer inclusion of this concept (using the similar term *huella hidrológica* –hydrological footprint-) into the National Hydrological Planning in Spain through an Instruction published on the Official State Gazette (Ministerial Order ARM/2656/2008, 10th September), from the work of the Spanish Water Footprint research group coordinated by *Observatorio del Agua* at *Fundación Marcelino Botín*, rises the interest of this kind of applied research. The necessary mutual care between waters and citizenship resumes with the autopoietic tasks that waters do taking care of our health. So instead of asking ourselves whether urban waters have to be exploited (as a resource) or dominated (as a potential risk), we could think-act: what kind of knowledge and urban Politics do we carefully practice to persist in that pristine, wealthy reciprocity? This and previous questions are and must be open conclusions being put into action.

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