Water’s Flow of Peace

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By

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Cambridge
Scholars
Publishing

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This book first published 2020

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN (10): 1-5275-4651-9
ISBN (13): 978-1-5275-4651-6

Process Number: 2018/18485-4

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ACKNOWLEDGEMENTS

To the São Paulo Research Foundation (FAPESP), for providing financial support to make the research stages feasible in Syria and the United Kingdom and also for the assistance given to this publication.

To Professor Bahjat Mohamad, of the Geography Department of Damascus University, for the constant supervision, unwavering interest and skilled collaboration on this research, closely monitoring it.

To Mohamad Ali Abdel Jalil, for his prompt commitment to make my sojourn viable in the University of Damascus.

To Professor Keith Richards, of the Geography Department of Cambridge University, for his considerate acceptance of having welcomed me in his groups of study.

To Luiz Fernando Ary, for his support and expertise in translations of Arabic into Portuguese.

To Maria Alice Venturi, for her accurate final revision of texts (Portuguese version).

To Eduardo Felix Justiniano, for his outstanding skills on improving the quality in the illustrations in the Portuguese version.

To Adriana Tiemi Higuti and Luiz Fernando Ary for the challenging task of translating this book into English.

To Professor Sabah Mohammed Khamis Faraj, of the Babylon University, for providing us with information and pictures of the Iraqian stretch of the Euphrates river.

"The river reaches the ocean because it circumvents obstacles"
Mao Tsé-Tung

INTRODUCTION

The current book emerged from research implemented from 2010 to 2011 at the University of Damascus (Syria), mainly focusing on the analysis of the Euphrates River and water production in the Persian Gulf. When returning to Brazil, we deepened our study, which later became a habilitation thesis, defended in 2012 at the Faculty of Philosophy, Literature and Human Sciences of the University of Sao Paulo, which did not suppress our interest in the subject. During that same year, we conducted new work in the Persian Gulf, visiting desalination plants in the Sultanate of Oman in order to research the desalination process. Between October 2013 and February 2014, a new research stage at the University of Cambridge (United Kingdom) enabled us to make conceptual revisions and gave us access to updated data. It also allowed for the production of two scientific articles in English, not to mention the conversion of the thesis into a book[1].

Thus, this book is an empirical and conceptual updated version of the original thesis, however, it has fewer theoretical discussions, which responded to the interests of scholars rather than a wider audience[2]. From the theoretical discussion, we maintained only a number of concepts which support the reading comprehension of the book. Empirical updating was based, on the one hand, on new data collection on the current desalination process, and on the other hand, the current flow rate data of the Euphrates River. Conceptually, the revisions were accomplished by including other authors on the matter, particularly the British researchers, and also conducting group discussions and studies on water from which I currently attend[3]. Finally, besides the updates, the data gained more accuracy by

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[1] Both research stages in Syria and in Cambridge relied on the financial support of FAPESP (Research Support Foundation of the State of São Paulo).

[2] The original version remains available and open access at: <http://www.teses.usp.br/teses/disponiveis/livredocencia/8/tde-14032013-104333/pt-br.php> Accessed on: Sep. 23, 2015.

[3] Water Reading Group and River Basin Governance Group, groups of study coordinated by Professor Keith Richards, of the Geography Department at the University of Cambridge.

undergoing statistical analysis, which was of great help in strengthening the argument proposed, which is detailed in the following chapters.

The main objective of this study was to put into question the perspective of conflict resulting from an alleged water scarcity. We analysed the explanatory structure comprised by two variables mutually interfering with unilateral dependency: *i.e.* the paradigm of water scarcity – conflict, in which the second variable is a consequence of the first. This scheme was chosen due to two reasons: the first arises from the fact that it is being widely disseminated across academic and political communities, in the media and in textbooks, despite being devoid of scientific basis; the second derives from the fact that its influence is negative on public opinion and revives fatalist thoughts already questioned, such as the Malthusian Theory of Population.

The choice of the Middle East as the empirical basis of the study was due to the direct association made of the region regarding the two elements of the paradigm: water scarcity and conflicts. Even though these two elements are indeed present in the region, the causal relation attributed to them is questionable.

The study, then, was driven towards a general hypothesis, constituted by two variables, in which both hydrographic basin sharing and technology contribution regarding water production would make the relation between scarcity and conflict ineffectual for a full comprehension of the realities elected as the topic of study for this analysis.

The first variable emphasised the predominance of sharing water resources, even in an extreme water scarcity scenario, weakening the perspective of conflict. As indicators of this sharing, we investigated specific agreements which have ensured an equitable appropriation of water resources and the resulting maintenance of the fluvial flow and water quality of the Euphrates River.

The second variable, referring to technology contribution, proved advances related to freshwater production to be gradually and rapidly reverting the situation of water resource scarcity and therefore the perspective of occasional conflicts due to disputes over resources. As indicators of this process, we analysed the evolution of freshwater by seawater desalination and the gradual substitution of natural sources by such industrial techniques in the Persian Gulf. The analysis on drinking water production on an industrial scale led us to a parallel and specific objective: a conceptual

revision concerning water resources, since their main definitions, which classify them as a mere renewable resource, lost accuracy before those realities. Thus, a new conceptual proposition concerning water resources was added to the research results in this book. Finally, we concluded by arguing the empirical and conceptual unsustainability of the paradigm which causally relates water scarcity to conflicts and proposed some adjustments, incorporating various other aspects to this relationship.

CHAPTER 1

SUPPORTING CONCEPTS

Scientific concepts are formulated within the universe of reasoning on the basis of a sensitive-world observation; therefore, rendering complete accordance with it. In this regard, such concepts must be continuously adjusted in order to best suit the new contexts constructed by science itself, outlining a pathway of permanent revision. This is particularly what happens with freshwater, for instance, despite its current industrial-scale basis production; it is still regarded as a mere renewable resource. The notion of accuracy is therefore equivalent to the degree of approximation between the concept and the object explained by it. The irrefutability of a given theoretical proposition (a concept, a paradigm, law), contrary to what it might suggest, represents its scientific weakness rather than its strength, taking into account Karl Popper's perspective, in which it is stated that the scientism of a proposition lies in the possibility of its being refuted. In this respect, we search for conceptual distortions via new experiences based on observational criteria in accordance with the "black swans" theory of Popper (2007) in the search for improved conceptual accuracy. The following concepts shall provide a thorough grounding for the comprehension of this book.

Water stress

The concept of water stress was first defined by Malin Falkenmark in 1976, on the basis of natural conditions for water availability of the United Nations member countries. Therefore, there are two aspects to be considered: on the one hand, the quantity of water from natural resources currently in a country; on the other hand, its demographic situation. The ratio cubic metre per inhabitant per year is reached by dividing the total amount of water by the total population. Considering that, a value below the basic needs to sustain a fulfilling quality of life would be underserved, therefore characterised as water stress, a situation in which the availability *per capita* ranges from 1,000 to 1,700 m^3 per inhabitant per year (although these values diverge, according to different sources).

Aldo Rebouças (2004) warns against the indiscriminate employment of such a concept, since it is commonly addressed to a number of situations where there are water supply problems, which often emerge from poor management rather than an impaired relation between water and population, mentioning the metropolitan region of São Paulo as an illustration of this misconception (p. 69). On this matter, we have also added that both pollution of freshwater springs and leaks in water distribution systems[4] contribute to a situation that should be better characterised as managerial water stress rather than natural water stress.

Thus, it might be implied that, in compliance with the concept of Falkenmark, which correlates water quantity and population, among the countries comprised by this current study, only Syria and Iraq present no water stress. Nevertheless, as we shall see further on, such countries face more serious water supply problems, including an acute absolute scarcity of water resources than those countries of the Persian Gulf do.

By combining the concepts of both Falkenmark and Rebouças, we were drawn to the conclusion that it is therefore unreasonable to consider such an approach as natural water stress. Ecosystems function successfully according to different quantities of current water resources, taking the Amazon and Sahara as extreme examples. Water stress is only characterised when the population is affected by a natural water scarcity (or aridity). If this were to occur, the reasons will always be at the expense of social demands, since decisions on living in either this or that region is a social determinant, as well as the competence of a population to ensure its water supply via already long-established techniques. It is in this social dimension, precisely related to water resource management, that it can be implied, for instance, why supplying the population is assured in the Persian Gulf (characterised by severe water scarcity) whereas the Amazon (where there is the world's highest amount of freshwater) discloses the lowest indexes on accessibility to drinking water in Brazil[5]? Therefore, if a population is affected by a deficient water supply, the reasons are always social, *i.e.*, there is only managerial water stress[6].

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[4] According to Rebouças (2004), losses in the Metropolitan Region of São Paulo ranges from 30% to 40% of total treated water, while in developed countries these values range from 5% to 15% (p.70).

[5] In accordance with the National Water Agency of Brazil (ANA-SNIS).

[6] Read more about this at: <www5.usp.br/tag/crise-hidrica/>. Accessed on: Sept. 23, 2015.

Natural resources

The comprehension of what constitutes a natural resource is only possible from a dual perspective: sociological, because the fact of it being something that one resorts to implies the existence of a demand which varies, comes into existence or vanishes according to different historical and socioeconomic contexts; and natural, since in most cases, it is materially comprised by elements that depend on natural dynamics so that they take place and settle on the Earth's surface. Therefore, a natural resource is an integrating concept and its comprehension requires a geographical analysis, which incorporates both social and natural dimensions in time and space. Natural resources represent thus the main link between society and the natural world. The definition adopted in this book on the concept of a natural resource is as follows:

> *A natural resource can be defined as any element or aspect of nature that is in demand, is either susceptible for use or is currently being used directly or indirectly by mankind as a means of meeting their physical and cultural needs in any time and space […] (Venturi, 2007, p.15).*

In the first excerpt of the definition, both "aspect" and "indirectly" enable us to contemplate those non-material resources surpassing the idea of a resource as an extracted and transformed element. Conservation units, for instance, display a list of resources whose uses are indirect, *i.e.*, for contemplation, recreation or environmental education. Other forms of non-material resources are depicted, for instance, by landscape itself (*e.g.*, an ocean view, natural parks, etc.) which are appropriated by real estate marketing and materialised into property value. The relief itself is an indirectly appropriated resource at hydroelectric power plants, which, in turn, harness water as a direct resource, not to mention in agriculture, where the soil is the directly harnessed resource enabled by a flatter relief in some productive models, such as in the agribusiness sector.

The term "demand" and the expression "susceptible for use", play a key role in granting historicity to the concept, insofar as it makes no sense to classify something as a resource if, on the one hand it is not susceptible for use (due to technical limitations, as occurs with the still inaccessible heavy metals in the inner part of the Earth); or, on the other hand, such a resource is not in demand. For Godard (2002),

> *Resources should not be fixed assuredly; the content of what we name resources transforms historically and relies on both environmental*

> *evolution and the evolution of technical possibilities, and the nature of social and economic conditions as well. (p. 207)*

Thereafter, the inclusion of these "cultural necessities" allows us to go beyond the resource-necessity ratio, and thus includes resource appropriation as the satisfaction of demands coupled with cultural motives, such as the appreciation of an ocean view (*i.e.*, it is not a matter of necessity, but a desire instead), the environmental education, and the recreational facilities developed in the conservation unit, among others.

Ultimately, the expression "in any time and space" makes the concept universal, which can be applied to primitive (*e.g.*, indigenous peoples), capitalist, socialist or even feudal societies.

Natural resources differ from natural wealth due to the fact that the first are not necessarily able to be converted into wealth. This mainly explains why there are resource-rich countries, but with impoverished populations and a low human development index (HDI).

Renewability and exhaustibility

Natural resources can also be subdivided into several categories. They are commonly classified into renewable and non-renewable resources, which as a classification is somewhat insufficient. There are a number of variables that may increase or reduce resource renewability, which is not uncommonly related to mere physical characteristics but management and forms of usage as well. An iconic example of it is soil as a resource, which, depending on climatic conditions, presents higher renewability (warm and humid climates); concurrently, depending on the kind of management and use it may deplete more rapidly and thus have its renewability reduced.

The concept of renewability is almost imbued with the notion of time. In principle, all Earth's resources would be renewable, as long as the processes through which they were formed do not cease. However, only those whose renewal rate occurs within the social time scale are the ones which can be regarded as renewable. Therefore, resources such as hydrocarbons, which renew themselves and recover their stocks by natural mechanisms over millions of years, cannot be considered renewable in terms of societal use. Nevertheless, the concept of a resource being naturally renewable within the social time scale is not sufficient to classify it as renewable, since its exploitation rate might be superior to its replacement, thereby making them

exhaustible, as occurs with forests, soil and fish, among other resources *a priori* considered renewable.

In short, the concept of renewability can only be understood by linking both natural and social dimensions. Once done, there will be no antagonisms between renewable and exhaustible resources. Such resources, even those naturally renewable, might become exhaustible due to a pace of usage superior to that of its renewal. On the other hand, they can be non-exhaustible, even though they are non-renewable, due to their current stock balance, *e.g.*, water, as we shall see in Chapter 7. In this case in particular, the notion of space (spatial dimensions, occurrence scale) is more important than time itself. Forests, for instance, can be considered as renewable under the perspective of nature, since they are capable of renewing themselves by natural mechanisms. Nevertheless, the incorporation of both human dimensions and notions of time and space may undermine such a classification. With regard to time, the forest as a resource becomes exhaustible if the exploitation rate surpasses its ability for renewal. In relation to space, the forest as a resource loses its renewability capacity in case the deforested surfaces are excessively wide. Chances for a forest to recover tend to be inversely proportional to the extension of the deforested area, particularly in rainforests, in which both soil fertility and air humidity, *i.e.*, renewal conditions, arise from the forest itself.

Ultimately, a recurrent misconception consists of considering mineral resources as exhaustible. Such an idea may be refuted if one considers the non-exhaustibility of raw materials (*e.g.*, for civil construction) and sea salt, just to name a few. The latter, besides being a renewable mineral, can be considered as non-exhaustible in time and space.

Park (2011) defines a renewable resource as

> *a natural resource (such as freshwater, forests or renewable energy) which is recovered in a pace, at least, as fast as the usage rate, and capable of renewing itself and also be indefinitely obtained under* ***accurate conditions****, but can be converted into a non-renewable resource if submitted to overexploitation […]. (p. 378, emphasis added)*

Therefore, as the rate of natural renewal is steady, while the exploitation is not; renewability is, to a large extent, linked to resource management. However, the possibility of the exhaustibility of a renewable resource due to its misuse is not restated by Park (2011), when defining an exhaustible resource only as "any non-renewable resource (such as minerals, non-

mineral resources, fossil fuels) which is present in fixed quantities in the environment" (p. 162).

Reproducible resources

Resources can still be reproducible, as proposed by Godard (2002, p. 207), which is, in turn, different from the renewable category. In the latter, the resource renews itself and its stocks are recovered by natural mechanisms; for instance, a forest that recovers itself, a kind of soil that, under favourable climatic conditions, recovers its physical and chemical properties, or even species of animals whose populations are able to re-establish by themselves, etc. However, in case mankind intervenes in the process of renewability in order to accelerate it and to meet social demands, the resource now belongs to the "reproducible" category, as is the case of any crop, forest, aquaculture, and all those resources that reproduce themselves at unnatural rates by human interventios. We shall resume this concept in the conclusion considering that it will be used in the conceptual revision on water resources.

In short, the concepts embraced herein always contrast natural time with social time. In general, natural time is slower than social time, but we have to take into account that the existence of a society could be more long-lasting than a number of natural resources which may be exhausted before it.

Border and trans-boundary rivers

Border rivers are those that form boundaries with two or more countries, such as the Paraná River, which serves as a boundary line between Brazil and Paraguay[7]. Trans-boundary rivers cross the territory of two or more countries[8]. Obviously, this same river may have both border and trans-boundary stretches.

The significant increase of nation-states in the twentieth century, whether by decolonisation (*e.g.*, Africa and the Middle East) or by dismemberment processes (*e.g.*, the former Yugoslavia and the former Soviet Union)

[7] Glossário de termos referentes à gestão de recursos hídricos fronteiriços e transfronteiriços (Glossary of terms on management of boundary and transboundary water resources - Brazil, 2011).
[8] Article 2 from Resolution no. 467, October 30, 2006, National Water Agency of Brazil.

transformed a number or rivers into trans-boundary ones, broadening their internationality. This is the case of the Danube, which, due to the dismemberment of Yugoslavia and Czechoslovakia, now runs through several different nations.

Countries sharing trans-boundary rivers would tend to present a greater potential for conflict than those which share border rivers. This would occur due to the fact that, by sharing trans-boundary rivers, downstream countries would, in principle, be more vulnerable than the upstream countries; and to some extent, they would depend on not only the good will of their neighbours but also an accurate sharing policy which ensures flow rate and quality. In turn, upstream countries normally hold greater power to control water resources, mainly by building dams that grant, inter alia, the steering of flow rate, even though not completely. Although the countries which share the same boundary type fluvial course present the same geographical condition in relation to the resource, it may not spare them from conflict; different practices undertaken on each side may lead to an impairment on either the amount of water (erosion, for instance) or its quality (*e.g.*, sewage disposal or widespread pesticide use in farming).

The Euphrates River, analysed herein, is characterised as being a trans-boundary river, because it runs through Turkey, Syria and Iraq, as we shall discuss in greater detail further in this book.

Conflict

The term conflict will be widely used in this book, since it is an element of major importance on the paradigm under discussion. Therefore, it is necessary to explain what we consider conflict, since it is a broad term, which can encompass anything from minor diplomatic incidents to belligerent confrontations.

Wolf et al. (2003, *apud* Katz, 2011, p. 2) "[…] mentions the lack of a clear usage of the term 'conflict' as a cause that contributes to both confusion and disagreement concerning [the] Water Wars hypothesis". Katz (2011) proposes a definition that, according to him, is commonly used by both proponents and critics of "Water Wars" hypothesis (p. 2). Thus, conflict is defined as a situation in which there is the use of armed force by political organised groups that dispute, specifically in this context, either the control or access to water resources, in particular freshwater.

Hsiang, Meng and Cane (2011, p. 2) also associate the idea of conflict with belligerent confrontation, yet defining a minimum number of 25 victims resulting from a conflict between a government and another organised group. In this book, we do not stipulate either the existence or the number of victims, but we comply with the idea of armed conflict.

Therefore, among multiple degrees and scales of conflict, we consider herein only the episodes in which two or more countries engaged in armed confrontations, ruling out diplomatic, economic or social disputes. Nor are we considering the internal conflicts, in which groups of the same country may have fought for water resources. This notion of conflict is equivalent to the political approach to war of Aron (2002), who claims interstate conflict as a "perfect war" (p. 223). Such an approach was required in order to enable this current study, because non-military, diplomatic or conflicts from any other nature – or even national internal conflicts to varying degrees – may exist on a general basis. There is no secure database to handle such wide ranging and assorted contexts, and in doing so ensure that water is the main cause of conflict, rather than being regarded as just one of its facets. This notion is justified by the fact that pronouncements under either the paradigm "scarcity-conflict" or "water war" always refer to an international warfare approach more or less explicitly.

Revisiting Malthus

Finally, it is necessary to revisit some theoretical aspects of the work of Thomas Robert Malthus (1766-1834), since it can help to understand the logical schema of "scarcity-conflict". Malthus, a British economist and demographer, developed a wide range of work on themes such as the self-regulation of vegetative growth in face of the limits of both natural resources and means of subsistence. His remarked compendium includes the six volumes of *An Essay on the Principle of Population*, published between 1798 and 1826 (Malthus, 1985). Malthus formulated some laws that, when combined, would promote – at least logically – the explanation of the existence of starvation. Population growth would lead to a demographic surplus from which unemployment, reduction of proceeds, starvation and progression of disease would take place. Such events would periodically "visit" humankind, teaching them about their growth limits. Therefore, population growth, which is faster than food production, should be controlled; and, to that end, he proposed some laws and moral precepts. Malthus was an Anglican clergyman, who expressed his propositions either in a moralistic or fatalistic tone. Even so, he was highly respected in his time

and exerted influence over Charles Darwin in his formulation of the theory on the evolution of species.

In this book, it is exactly that fatalistic tone from Malthusian theory with which we characterise our paradigm. The heralds of conflict arising from water scarcity do not pay due regard to both technical and planning possibilities for a balanced approach to a population's water supply problems.

Both contexts chosen for our analysis highlight one of these aspects; showing that unlike Malthusian precepts, agreements, technical planning and development can subvert this "natural trend" of the facts.

CHAPTER 2

THE EXISTENCE OF THE SCARCITY-CONFLICT PARADIGM

In the study presented in this book, the paradigm analysed conveys an explanatory scheme based on the causal link between two aspects: the scarcity of water resources and the resulting potential for conflict. This model, though simple, has a nomic-like nature because it would fit in any time and space as a logical scheme: if there is a lack of water, there will be conflicts for its possession or usage.

Structurally, such a paradigm lies at the interface of natural and human sciences, because it is comprised of two different dimensions: the first one is more stable, related to water dynamics, which depends on natural laws; and the second one is more interpretative, hermeneutical, which refers to the appropriation of resources and their outcome. The hermeneutical dimension would justify its reinterpretation before the "fads" of contemporary reality, whereas the other dimension, water dynamics, is a constant in the social time scale.

The debate over this paradigm thus constitutes an authentic geographical problem. However, its revision is only an adjustment, or rather, making use of Kuhn's term, "polishing work" (Reale, 2006, p. 177). In times of "normal science", this revision is possible and is described by Kuhn (1970) as follows: "In the normal change, one can simply either revise or add a simple generalisation while all the rest remains the same. […] Normal science also changes the manner by which the terms bind to nature". (p. 29)

By incorporating the scarcity-conflict paradigm *a priori* (*i.e.*, before the analytical process takes place), some authors announce conflict frameworks whose object under dispute is water, which is actually disputed due to either its scarcity or insufficient stock availability, falling far short of the demand. This posture, at times dogmatic, is referred to frequently by the media. Ideas such as: "If in the twentieth century conflicts involved particularly oil; in the twenty first century, wars will mostly be over water" and other similar

quotes are quite familiar to us, bearing in mind the constancy with which they are broadcasted. Even certain international organisations embrace this fatalistic perspective, although it is the role of these institutions to warn against possible adverse future events. The report of the United Nations Environment Programme (UNEP) envisages that, if current conditions persist, approximately 1.8 billion people will be living in regions with water resource scarcity[9].

That paradigm herein has a premise-like nature rather than a hypothetical one, so that there will be no supporting effort related to its existence, but only elucidative and illustrative efforts on how it is fed and disseminated by various sources. Their heralds are scientists, politicians, media agents, opinion makers and authors of geography textbooks.

For Katz (2011), "predictions of inevitable and eminent wars arising from water scarcity are commonly made by prominent political figures, scholars, journalists and nongovernmental organisations (NGOs)"[10].

As an elucidative and illustrative resource, we have identified and listed statements containing both variables "water scarcity" and "conflict", even though the latter may appear implicitly. When it is stated that "wars in the twenty first century will mostly be over water", the idea of scarcity is present, though it is not explicit. The statements listed above also depict a causal relationship and one-sided dependence between the variables, in which water scarcity would be the leading cause. They are coated with a prognostic nature and often refer either to Middle Eastern or global contexts. The following are some examples on the dissemination of the paradigm in the academic environment from political authorities, media, opinion makers and geography textbooks.

Academic environment

Various authors from several nationalities predict wars involving water scarcity as Berman and Wihbey (1999), when they state that:

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[9] Available at: <https://www.un.org/en/events/environmentconflictday/pdf/GN_Renewable_Consultation.pdf>. Accessed on: Sep. 23,2019.

[10] David Katz is a professor at the University of Tel Aviv, and a researcher in economics and natural resources, management of trans-boundary resources and restoration of ecosystems.

> *Mutual confidence over such resources has made water a conflict catalyst. [Turkey and Syria] have been on the verge of war several times. […] The Middle East is about to deteriorate in regional struggles concerning allocation and water access. Nations around the region are drifting towards conflicts over water.*

Homer-Dixon (1999)[11], professor at the University of Waterloo, Canada, converges towards this perspective of conflict and violence under the proposition that "[…] environmental scarcity will have deep social consequences, encouraging insurgencies, ethnic clashes, urban rebellions and other forms of civil violence, particularly in the developing world"[12].

Michael Quinion, a British author who published a number of works on terms and expressions[13], fosters and disseminates a glossary of English "universal words", among which is the expression "World Water Wars":

> *[...] a type of conflict [...] due to an acute water scarcity for consumption and irrigation. [...] Possible foci have been envisaged in the Middle East, in parts of Africa and in a number of the largest river basins in the world, including the Danube*[14].

Clarke and King (2005), North American researchers, warn in their work entitled *The Water Atlas* against the risks of twenty first century wars arising from a growing scarcity on the basis of statistical data.

At World Water Week, in Stockholm (2005), several scientists warned against the danger of wars over water. Mitsch, from the University of Ohio, United States, stated that: "We had an oil war […]. Such an event took place during our time. Now, there may be wars over water"[15].

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[11] Homer-Dixon develops interdisciplinary research in Economics, Political Sciences, and Geography. He is the author of several books, among them: *Environment, Scarcity and Violence* (New Jersey: Princeton University Press, 1999).
[12] Available at: <https://homerdixon.com/wp-content/uploads/2017/05/Environmental-Scarcities-and-Violent-Conflict-Evidence-from-Cases.pdf>. Accessed on: Sep. 23, 2019.
[13] Among them, the dictionary: *Logisms and isms*. London: Oxford University Press, 2002.
[14] Available at: <www.worldwidewords.org> Accessed on: Sep. 22, 2015.
[15] Available at: <http://ambientequalvida.blogs.sapo.pt/69407.html>. Accessed on: Sep. 22, 2015.

There are also authors in the Arabic academic community, such as Assaman[16], who herald wars even in the titles of their books (*Water Wars in the Middle East*), containing suggestive covers depicting tanks and warplanes and enchained faucets.

Such a perspective of water wars is also fostered within the Brazilian academic community, reinforcing it as a paradigm used to interpret those contexts. For Olic (1999),

> *in the twenty first century, wars that break out in the Middle East will presumably have more to do with water than they will with oil. This warning seems increasingly more concrete, and there are even hypotheses on the emergence of hydro-conflict zones, one of them lying within the basins of the Tigris and Euphrates Rivers […]. (p. 42)*

Political authorities

Some international authorities have also prophesied war over water in the twenty first century, for instance, Ismail Serageldin, former President of the Central Bank and World Commission on Water, who stated that: "Wars of the next century will be fought over water" (in Bouguerra, 2004, p. 91). In the same perspective, Wally N'Dow, the UNO's sector director, declared in 1996:

> *We believe that, by 2010, should massive improvements over obtaining and saving water not have been undertaken, we will be faced with a monumental crisis […]. While wars in the past century were over oil, we strongly believe that a number of political and social conflicts of the 21st century will revolve around water. (apud Bouguerra, 2004, pp.91-2)*

N'Dow's prophecy date is already overdue and there is no evidence of conflicts over water. What we still see is that there are millions of people with no adequate water provision, not due to conflicts between countries; but, rather, almost exclusively to the poor management of water resources often worsened by natural scarcity.

Political authorities who exercise great worldwide influence, such as Secretaries General of United Nations Organization (UNO), have also contributed to the dissemination of the paradigm scarcity-conflict. Boutros Boutros-Ghali, UN Secretary General between 1992 and 1996, claimed that

[16] We decided to translate and include this work, although the edition is from the author himself and has no dates, as included in the references.

"the Middle East's next war will be over water". In 2001, his successor, Kofi Annan (1997-2006), voiced in unison that "the fierce competition for fresh water is very likely to become a source of conflict and war in the future". That same year, he was awarded the Nobel Peace Prize. More recently, UN Secretary General, Ban Ki-Moon, emphasised that "water scarcity has triggered a greater risk for violent conflicts". Such examples reveal that the hypothesis on water wars lies at the heart of the United Nations, rather than the countless cooperation agreements which involve international river basins, and, thus, assure a cooperation scenario. Émile Lahoud, former President of Lebanon, joined the political group that foreshadows conflicts over water when,in 2001, receiving ministers of Arab countries, he stated: "Water is the new oil of the Arab countries"[17].

During events which gathered specialists, politicians and NGOs – events given broad media coverage – a number of prognostic statements on wars arising from water scarcity can be registered and the examples could be compiled to exhaustion. At the World Water Forum, Istanbul (March, 2009), the Swiss representative of Amnesty International voiced that "[…] there is no doubt that the twenty first century conflicts will be over raw materials, particularly water, which will be scarce everywhere"[18].

The media

The media is the most far-reaching advertising vehicle to disseminate the idea of conflict over water. Perhaps, due to commercial reasons, the possibility of conflict is worth more than peace itself. One example of this fact is evidenced by a statement from Professor Benedito Braga in the Brazilian newspaper *O Estado de São Paulo*. Despite its optimistic content, highlighting agreements and dialogues, the title of the interview depicted otherwise: "Where there is no dialogue, there are conflicts". There is a contradiction between the pessimistic title of the interview and its content that, actually, reinforces the belief in dialogue and cooperation.

> *The Amazon River Basin is shared with eight neighbouring countries and the Plate River Basin with four more. In Africa, the Nile serves ten more countries. In the Middle East, the Tigris and Euphrates Rivers flow through*

[17] Journal *El Liwa*, Beirut, edition of June 20, 2001, p. 6 (*apud* Bouguerra, 2004, p.99)

[18] Statement of Bruno Riesen. Available at: <www.swissinfo.ch/por/EspeciaVermelha/Noticias/Agua_sera_primeira_causa_de_guerra_no_seculo_21.html?cid=869066>. Accessed on: Sep. 22, 2015.

> *Turkey, Iraq and Syria, a complex region, not only with regard to the point of view of water. There are cooperation agreements in all of these examples […] nowadays; a commission meets on a regular basis in order to discuss policies for the Nile River. […] History has shown that conflicts are rare. Such alleged discussions on wars over water haven't shown an accurate technical foundation so far*[19].

The media has also darkly foreshadowed trouble in Canada, a country which is rich in water resources, but in which acid rain accounts for a serious pollution problem in a number of lakes. Bouguerra (2004) highlights the reference to Terence Corcoran, Toronto's *Financial Times* editor, to whom water will be "the oil of the 21st century" (p. 73). The author writes:

> *O woe to us! Water, essential for farming, a wealth generator and key point for food self-sufficiency; and, therefore, autonomy, awakens greed. Thus, struggles for power are never far away. Nowadays, water as a factor is a weighty variable in strategical equations. (p. 81)*

Even though this French-Tunisian geographer exposes different perspectives on water, he takes no stand in regard to the paradigm being discussed; on the contrary, he is always adopting a different and complementary position, and, at times, leaning towards statements of sorrow and warning. In a magazine article with the suggestive title "Fresh water: the gold of the twenty first century", the author states:

> *[…] overexploitation reduces noticeably the available stocks, but mankind is still reluctant to adopt measures which ensure its preservation. Of all currencies, water is the one which will determine either peace or war among nations of our century*[20].

In another article entitled: "Water: the war of the future", the author emphatically remarks:

> *[…] data is alarming. The problem is a fact and also real. It surpasses boundaries, but while it does not reach each household tap, scarce water will be problematic for more than a few. It surely is a question of time. We*

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[19] Licensed Professor on Environmental Engineering of Polytechnic School of the University of São Paulo (USP), former President of the Water World Council, organiser of the Water World Forum and Secretary of Sanitation and Water Resources of the State of São Paulo. Available at: <www.estadao.com.br/noticias/vidae,sem-gestao-havera-conflitos-em-breve,342624,0.htm>. Accessed on: Sep. 22, 2015.

[20] By Eduardo Arraia. Available at: <https://www.revistaplaneta.com.br/agua-doce-o-ouro-do-seculo-21/> Accessed on: Sep. 22, 2015.

> *are indeed dependent on nature; we should also pay greater attention to this issue, giving due importance not only to health but also the survival of many, by avoiding future wars*[21].

Both statements: "it surely is a question of time" and "we are indeed dependent on nature" denote a precise Malthusian perspective.

Opinion makers

Leonardo Boff, theologist and influential professor in Brazil, winner of a number of international and national awards and author of several books, also reinforces the dissemination of the paradigm scarcity-conflict despite his important influence. In his article "Water Wars", published on the ALAI (Agencia Latinoamericana de Información) website on January, 28, 2005, Boff reminds us that:

> *[…] The World Bank vice-president, Ismail Serageldin, has long truly said that: "if wars in the twentieth century were over oil, the ones from the twenty first century will be over drinking water". In fact, there are currently fifty conflicts in the world because of lack of water, since 40% of the world's population lives near 250 river basins. The Tigris and Euphrates River basins are the core of litigation between Turkey, Syria and Iraq; the Ganges and Indo river basins between Bangladesh, India and Pakistan and so are the river basins of the Nile and Zambesi*[22].

Such quotes hardly ever specify the data source provided above (fifty conflicts, 40% of the population), and are often general and indirect statements. Regarding the latter quote, we are led to believe that there are conflicts occurring between all countries mentioned above, a fact that bears no relation to reality. The term "conflict" is always employed on a general basis.

Columnists in Brazilian influential newspapers have also contributed to the dissemination and consolidation of the paradigm. Gilberto Dimenstein, in reference to the Second United Nations Conference on Human Settlements (Istanbul, 1996), wrote an article in the newspaper *Folha de S. Paulo* (*São Paulo Journal*) entitled: "Water will be the ignition of the twenty first century's wars", on February 7, 1996. In the article, the author declares:

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[21] By Alexandre Chut. Available at: <http://amigosdanatureza.net/educacao-ambiental/recursos-naturais/agua-a-guerra-do-futuro/>. Accessed on: Sep. 22, 2015.

[22] Available at: <https://www.alainet.org/es/active/20539>. Accessed on: Sep. 22, 2015.

> *[...] water scarcity in the Middle East and African countries will be the leading cause of wars in the region in the next century. [...] conflicts will arise from the dispute over the Nile, Tigris and Euphrates Rivers, responsible for supplying most of water to this region. [...] Countries which are more likely to have conflicts are Egypt and Ethiopia (on the Nile River) and Syria and Iraq against Turkey (which dispute the Tigris and Euphrates Rivers). [...] A report by the World Bank, published in August, 1995, also warns against the risk of wars over water. "Many of the wars in this current century will be triggered by the fight for water", according to the report.*

In this case, there is even a prediction of where wars shall commence, and the alliances have already been pre-established (Syria and Iraq against Turkey). These precise and sophisticated forecasts are also made by newspaper columnists who are not experts on the issue[23], as observed above.

At the Sixth World Water Forum, in Marseille (France, March 2012), the president of the World Youth Parliament for Water (WYPW), Bart Devos, stated: "For me, it is no surprise if conflicts over the 'blue' gold succeed those ones over 'black' gold", regarding water and oil, respectively.

Pope Francis himself, whose pronouncements place him as a prominent opinion maker, has greatly contributed to the paradigm. In June, 2005, the Pope launched the *Encyclical* entitled *Laudato si* (Praise Be to You), on the care for our common home, which issues a strong emotional appeal to care for environmental and natural resources. In his New Year message, he reminded us that "it is a compulsory duty that Earth's resources shall be used in order that everyone can be free of hunger". With reference to water, the Pontiff reinforces the importance of the universal access to drinking water: "[…] access to safe drinking water is a basic and universal human right, since it is essential to human survival and, as such, is a condition for the exercise of other human rights".

The contribution of *Encyclical* to environmental issues related to social injustice is unquestionable and it will certainly impact on the faithful awareness of this matter. Nevertheless, the Pontiff ends up, between the lines, strengthening the fatalistic paradigm which we question herein, when in *Encyclical* he states his fears war over water in this current century:

> *As the quality of water available is gradually deteriorating, in some places, there is a growing trend towards privatisation of such a limited resource*

[23] Reasons for these warnings on the media will be discussed further, in the Item "Other Reflections".

> *[…]. It is expected that the control of water by multinational companies will become one of the main sources of conflict in this century.*

A number of examples of this kind presented above provide solid empirical evidence of our paradigm, even though there is no empirical support per se. Moreover, these examples show that most of the pronouncements are made by non-experts and also with no substantial grounds.

Geography textbooks

Analysing some collections of geography textbooks approved by the National Textbook Program 2012, named PNLD 2012 (Programa Nacional do Livro Didático[24]), we found several examples of the dissemination of the water scarcity-conflict paradigm nearly always related to the Middle East and the fatalistic perspective as well.

In a collection for secondary school students entitled *Território e sociedade no mundo globalizado* (*Territory and Society in the Globalised World*), on the topic "Water geopolitics", Lucci, Branco and Mendonça (2010) write:

> *Probably, drinking water will be the most disputed natural resource on the planet in this century. Its* ***scarcity*** *in a large number of countries, mainly in Africa, Asia, and particularly in the* ***Middle East****, will be the principal* ***cause of wars****. (p. 200, emphasis added)*

The authors proceed by quoting an excerpt from research by the International Studies Centre, in which it is stated that "many wars in this current century (twentieth century) were the fruit of disputes over oil. Next century (twenty first century) wars will be over water" (p. 200). Thus, the general idea of there being water wars in the world in the twenty first century is disseminated, particularly in the Middle East.

> *In Turkey, the construction of Ataturk Dam and diversion of water for agricultural areas irrigation […] have diminished the volume of the rivers [the Tigris and Euphrates], jeopardizing countries reached by their waters. […] In a war situation, either the destruction or the contamination of dams and aqueducts and water treatment facilities are part of combat strategies. (Lucci, Branco, Mendonça, 2010, p. 201)*

[24] This programme, developed by the Ministry of Education, assesses textbooks subscribed in them under hundreds of criteria. Books approved and selected by professors are distributed for free at public schools in the country.

In this excerpt, on top of the paradigm's dissemination, there is inaccurate information: Ataturk Dam affects only the Euphrates River and it has not diminished the water volume downstream, as we shall see hereinafter[25].

In the collection entitled *Geografia Global* (*Global Geography*, Almeida, 2010), aimed at secondary school students, the author announces that "this type of conflict" known as 'water conflict', according to analysts, will likely increase over the twenty first century. Still among the books approved at PNLD 2012, we found other examples of how the idea of conflicts over water scarcity is disseminated, particularly in the Middle East. In the collection named *Geografia - Sociedade e cotidiano* (*Geography – Society and Daily Life*), Martins, Bigotto and Vitiello (2010a) make a connection between regions and desalination, also referring to Mesopotamia:

> *On the other hand, countries comprising the Arabian Peninsula, in order to compensate for the lack of freshwater, need to build large seawater desalination plants which demand both major investments and energy costs. Therewith, some conflicts are able to intensify in the region. This is the case of that water shared by the Tigris and Euphrates Rivers, crossing Turkey, Syria and Iraqi territories. (p. 273)*

In this excerpt, students may be biased to connect desalination with an enhancement of conflicts, which, in our current work, we will argue against.

Even the collections aimed at elementary school students already bring the fatalistic perspective of water wars. In the textbook for the 9th year students from the collection of Martins, Bigotto and Vitiello (2010b), there is a text entitled *Guerra pela Água* (*War Over Water*), in which the authors state that:

> *experts on international politics warn that: freshwater shall be one of the main reasons for conflict in this century. It is well known that nations worldwide have promoted heated battles over the use of natural resources […] in the 21st century, the perspectives might be even worse. (p. 254)*

Once more, mention was made to "various experts" in a general way, with neither no specifications nor illustrative examples of real conflicts. Moreover, "heated battles" remain nameless and placeless.

Finally, one more collection addressed to elementary school students reinforces the idea that even younger scholars are already subjected to both fatalistic and Malthusian forecasts for water wars. In *Geografia crítica - O*

[25] In Chapter 6, "Maintenance of the Euphrates River".