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Brazil's and Scotland's Water Policies: A North-South Comparison

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Abstract

Water management is a main public policy issue and an important matter inside of the political context of any nation. The comprehension of water policies is directly related to national development strategies. This paper examines the water policies aspects of two different but emblematic national experiences (in Brazil and Scotland) and address multidimensional and territorialized questions. *Brazil* has the largest stock of surface freshwater in the world and the country's development increasingly depends on adequate water policies and improved technical and managerial strategies. By its turn, Scotland is famous for high water quality and for recently implemented of the most ambitious institutional water mechanism in Europe. Our analysis contrasts the two national water policy frameworks through a consideration of their political and territorial particularities. This comparative analysis is undertaken by the use of common matrice that helps to showing the outcomes of each country policy. The text contributes towards the international debate on water institutional reforms and their associated political-hydrological challenges.

Keywords: water policies, Brazil water regulation, Hydro Nation

1. Introduction

Water is a main element of discussion when we are thinking about environmental management and conservation, as it encapsulates many of the difficult and challenging aspects of public policies, business decisions and basic human rights. It is a critical geopolitical element in the 21th century and relevant conflicts related to the resource has occurred in the last century. Water means life and responsibility and its lack is a synonymous of misery, chaos and death. Thus, that is fundamental the development of concept and application of water governance (note 1). Rogers and Hall (2003) and Amaral and Wang (2013) show that water governance has a core importance if its strategical actions are linked with economic, environmental and social sectors (if it is not, water governance do not have efficiency, neither evolution, meaning pure poor governance).

Moreover, the concept of water governance needs to be gradually structured by the complex aspect of understand the water policies and water problems not only inside the technical and even sometimes limited "water box" context, but entangling the non-water centric perspectives as well. Water governance is a strategical and political concept that is being builded by social and environmental drivers, institutions, actors. These stakeholders sometimes are not being so valorized by traditional water sectors that valorizes the water-central perspectives (L öe & Petterson, 2017). This broad, complex and heterogeneous panorama of water governance is an undeniable fact that valorizes other important study themes that are deeply related with water policies such as political ecology, social politics (within water related conflicts) and environmental planning of territories (when related with water abundance conceptions) (Schulz and Ioris, 2017). Following this idea, that is important to explain the water policies within a context that moves beyond the classical water policy epistemology (not ignoring the classical sectors anyway), highlighting the influence of social and economic groups that create rules, ideas, aims, strategies and future water perspectives of a nation.

So, searching for a clearer discussion about water and politics, this paper aims to: 1) Develop a comparative study between Brazil and Scotland water policies, analysing their geopolitical importance; 2) Understand Brazil ś and Scotland ś water political sectors of influence, searching for a better comprehension of the "water political arena" inside these two representative countries.

It is important to show that comparative studies, which are linked to the water governance scope, are tools to comprehend

strong or weak strategical points inside country policies and actions and if these core points are similar or not around water world policies. Some references could be set here, as Rogers (2002) and his description of Mexico, Brazil, Chile, Argentina and Honduras policy water situation, Barraqué (2003) and his comparative water policy study between some European countries, Huntjens et al. (2011) and an interesting comparative study of water governance among eight different countries, and Hurlbert and Diaz (2013) with a Chile and Canada's comparative water study. These examples have explained the sort of challenges that are being present at the aim of transform a water policy into an efficient, social and equity and sustainable one. Following this idea a comparative study between Brazil and Scotland is a traditional way of research within water governance area but which has true value and good results.

A comprehension between Brazil and Scotland water policies offers important insights, even because Brazil has the biggest freshwater reserves in the world and Scotland has one of the highest levels of water quality. Brazil has 12% of all superficial water of the planet, and 28% of America's continent water resources. More than a half of this water quantity comes from Amazon Basin. In addition, this country has very important aquifers (e.g. Alter do Chão, Serra Geral and Guarani) which contribute substantially with Brazil water stock (GEO Brasil, 2007). On the other hand, the majority of Brazilian water reserves are located in remote areas, far from the main metropolitan centres as Rio de Janeiro, São Paulo, Belo Horizonte, Salvador, among other Brazilian capitals. Because of that, Brazil has the challenge of developing its water policies, protect the quality of its own water and modernizes its management water system to: 1) reduce the waste rate of potable water; 2) guarantee enough quantity of usable water for its internal demands of production and energy; and, lastly, 3) solve its historical problem of water shortage in North-east region and in rapidly growing metropolitan areas and agribusiness production regions.

Brazil have improving its water policies since the creation of Law 9433 in 1997, aiming for a more efficient, sustainable and decentralized water system of management. Nevertheless, an optimum water management system needs a creation of a new structure of management with an enough technical cover data of Brazilian water potential, plus capable human resources working through rational methodological proceedings. That is a real challenge to the Brazilian nation.

In the other hand of this comparative study, Scotland is a country remarkably associated with water resources quality and availability (especially surface water), with a great potential for further uses. More than that, Scotland has a deep historical link related about water (e.g. salmon and trout fishering activities, whisky production, and lake tourism activities). About this issue, we will quote the paragraph below (Scottish Development International, 2015, p. 7).

> *Scotland is a water rich country, has the wettest climate in the United Kingdom (UK) with the Western Highlands of Scotland being one of the wettest places in Europe. Over 1.9% of land surface in Scotland is covered by freshwater, with around 70% of the area and 90% of the volume of all the UK's inland surface water found in Scotland. The water contained in Loch Ness is nearly twice the amount found in all the standing waters of England and Wales combined.*

The notorious power of water resources in Scotland's territory gives condition to the development of the Hydro Nation strategy that the Scottish Government wants to develop (note 2). The Hydro Nation project could be described as an important Scotland's bet through European countries and also around the globe. Hydro Nation concept is a relevant geopolitical way of strengthening their influence among Europe (not only inside an environmental scope), as a reference of water globe technical and methodological centre, spreading its technical influence about water know-how.

The political Hydro Nation project is a vision of a more structured and sustainable Scotland about water resources policies and exploitation, low carbon emissions and saving energy. Moreover, Scottish Government refers about this initiative as a try to aim for the strengthening of Scotland position as a technological centre of water and environmental planning around Europe and the world (Scottish Government, 2012; 2015). The Hydro Nation challenge is to place Scotland as a world leader in: the governance of water resources, partnering with other nations in developing their water governance framework; the performance of its water industry (domestically and internationally) and its transformation to low-carbon sustainable approaches; the role that its research community takes in international research programmes, and; adding value to its water resources for the economy (Scottish Development International, 2015, p. 4).

Nevertheless, Hydro Nation project could be classified as an action to gain more evidence and influence within UK political arena, particularly considering the latent agenda of national independence that regularly bursts forth in the political debate. About this hypothesis, we could link an interesting study of Royles and McEwen (2015) about climate change, environmental sector and the political competences between Scoltand, Wales and UK.

Remembering about the political arena within Hydro Nation times, the result of 2016 UK Referendum is turning the Scottish-British relationship a bit more conflictive, with a consolidation of the Brexit political process within the European Union becoming a possible threat to the Hydro Nation project development. It's important to remember that the massive Scotland population had chosen to stay in the EU (62% REMAIN against 38% LEAVE, BBC UK Referndum - http://www.bbc.com/news/politics/eu_referendum/results), a huge different if we compare the final result at UK overall

(48% REMAIN, 52% LEAVE, The Guardian UK referendum: full results and analysis. http://www.theguardian.com/politics/ng-interactive/2016/jun/23/eu-referendum-live-results-and-analysis.).

2. Methodology

After a comprehension about the main references of water policies between Brazil and Scotland (to understand their geopolitical scenario), we want to develop a briefly water policy analysis between them. The technical tool for analysis that was chosen is an elaboration and interpretation of a common matrice showing the good and the conflictive aspects of each country policies.

3. Brazil and Scotland – Water Policies

Brazil and Scotland have some points in common about their water policies, both countries are attached to some water international conventions. We could give some examples of these conventions: the principle number 2 of Stockholm Declaration (endnote 3); the strengthening of human water access in 1977 (United Nations Water Conference, Mar del Plata, Argentina); the realization of Dublin Conference (The Dublin Statement on Water and Sustainable Development) in 1992, which shows in its principle number 4 that "*water has an economic value in all its competing uses and should be recognized as an economic good*". Dublin Conference was an important event that prepared nations to UN Conference for Environment and Development (UNCED) that was developed at same year, in 1992 in Rio de Janeiro, Brazil. That is relevant to mention the fact that UNCED was the conference that officialized the concept of sustainable development (Salman & McIverney-Lankford, 2004). Thus, we can present three main aspects related to water policies in the whole world and between these two countries as well:

1) The universal access to water by human populations;

2) Water as an economic good with economic value;

3) Water as a passive element of exploration, following the principles of sustainability.

Therefore, Brazil and Scotland follow this main concept into their water policies frame. In Brazil, the water policy frame is the Brazilian Water Act - Law 9433; In Scotland, the water policy frame is the Water Environment and Water Services Act of 2003. More than that, WEWS is strongly related with EU Water Directive Framework (2000).

Scotland is making a priority choice trying to become a leadership in water policies through a strengthening of concepts and geopolitical strategies of the Hydro Nation project (Scottish Development International, 2015). Moreover, Scotland is trying to become a world leader within hydric development actions inside a future world scenario that water issues are going to be more critical and complex. This issue is becoming more critical when we link this issue with global warming point (gradually becoming more influential each day since Post-World War II). Thus, the meaning of Hydro Nation is a fundamental element about Scotland geopolitical position inside a British and a European context. On the other hand, Brazil has a natural main role within global water policies, because Brazilian Territory has an undeniable strategical position about this matter. These countries are working hard to optimize their water policies and hydric infrastructures, within juridical, technical and political scopes. Table 1 shows the most important laws that related with water policies in Brazil and Scotland.

Table 1. Main legislation related to Brazil and Scotland water management

BRAZIL	**SCOTLAND** (endnote 4)
- Law 9433/1997 – Brazilian Water Act	- Water Environmental and Water Services Act (2003);
- Law 9984/2000 – creation of Brazilian Water Agency	- Flood Risk Management (2009);
- Decree CONAMA 357/2005 – classification of water quality levels in Brazil	- River Basin Management Planning – 2009/2015
- Decree CONAMA 396/2008 – classification of groundwater quality levels in Brazil	- Water Environment (Controlled Activities) (Scotland) Regulations 2011
- Law 12.651/2012 – Brazilian Forest Code	- Water Framework Directive - 2000
- Law 11.445/ 2007 – Brazilian Sanitation Law	- Water (Scotland) Act - 1980
	- Sewerage (Scotland) - Act 1968
	- Environment Act - 1995
	- Environmental Protection Act 1990, Part II, Waste on Land

See http://www.gov.scot/Topics/Environment/Appeals/EnvironmentalLegislation – about Scotland political acts
Source: Created by the authors

4. Two Different Countries and One Issue

When we compare Brazilian and Scottish water policies, we identify that these policies have different political and level

scopes, but it has many similar points, indeed. Each country is searching to strengthen its policy, seeking for more efficiency in its actions. Starting this comparative analysis, we should emphasize the most positive Brazilian point entangled about this issue: the juridical development of internal water laws (since the 1990's, especially from 1997 with the creation of Brazilian Water Law, until nowadays). However, Scottish technical-methodological water system, which is entangled with its laws (e.g. Water Environment and Water Services – WEWS), is showing a notorious efficiency at the present, which have become the Scotland's major point.

Essentially, Brazil has a comprehensive juridical framework of water laws, but Scotland has a better water management system. We will present some aspects about this point of view. First, the Scottish territorial scale of action (with a territory size equal of Brazilian Santa Catarina State) could allow a more efficient water management system than Brazil, however, to resume this comparative analysis within a scale factor is a naive thought. Anyway, that is a fact of ANA (Brazilian Water Agency) has a very different scale of action then the Scottish Environment and Protected Areas when we think about water management systems with different challenges, tasks and perspectives. A second relevant point is about WEWS law (2003) which has an axiological link with Water Framework Directive - WFD (Directive 2000/60/EC). WFD represents the European bet to modernize its water policy, and WEWS represents a Scottish way to develop its own water policy through WFD rules. The juridical and the technical influence of EU sector are elements that strength the strategical WEWS actions in Scotland, which means a strategical and positive influence of Europe water and environmental policies inside Scotland and Great Britain's policies scope. Lowe and Ward (1998) and Bache and Jordan (2006) can explain about the process of Britain Europeanization of its politics, the hard path of its internal implementation and following profits about that.

Nonetheless, Brazil does not have the same regional partnership to help with its water policy scope because MERCOSUL does not reach the same organization level that UE related to water, environmental, juridical and technical scopes. It means that WEWS structure and technical know-how are better developed because of the European and British water policies have experienced hard challenges among decades. In another way, Brazil faces the challenge of strengthening its water policy by itself since 1997 even with MERCOSUL partnership.

Describing this matter a bit more, we realize the Brazil struggles to become its water policy more efficient inside a technical view since 2000's. Some proves of this Brazilian struggle are the first evolutions of Brazilian River Basin Committees, the development of Brazilian Water Agency strategical actions, the creation of Brazilian State Water Programs (e.g. Brazilian Water Provides Program), and the development of PES projects (still very shy Brazilian initiative nowadays). Anyway, there is still a lack of technical know-how investments which searches for a better accomplishment of the Brazilian Water and Environmental juridical scope. Brazil seems that does not have enough technical resources yet that could develop an efficient water management system which could protect its water potential inside its 8,5 million kilometres' square of area.

An important factor to achieve a better technical water policy efficiency in Brazil is a strengthening of Brazilian water strategies and organization. The Brazilian water institutes strengthen certainly could be result on better achieves for higher levels of technical and political credibility. About this context, Fukuyama (2005) emphasizes that strong national institutes have a main role for every national development project. However, stronger water national institutes only come true when their human resources are technically strengthened as well, (which is strictly related to proceedings of know-how actions and logistic). Without a technical development of human resources and the water system, Brazil may suffer a possible blackout into its strategical actions. Brazil could prevent a possible "blackout", as long as pay attention in the following issues: 1) the lack of knowledge of its own national water characteristics (poor water diagnosis in remote but important areas of Brazilian territory); 2) unreliable prognosis within the strategical actions of Brazilian water projects (you cannot prognoses anything if you do not know about your water resources data); 3) lack of rational sustainability actions inside water policy actions; 4) unclear and not pragmatic actions or rules within the technical scope of water actions (lack of vision about strategical future actions).

About Scotland, the EU geopolitical complexity might be a possible threat to Scottish water policy development by itself (the EU group is composed by a large number of nations with different economical sizes and different territorial configurations each one, different geopolitical positions and ambitions and with a great range of cultural or even ethnical aspects). Another relevant point for Scotland is a strong desire of good part of Scottish people to be independent of United Kingdom (even with the NO victory in 2014 with the plebiscite) which could bring some questions about Scottish water policy actions (e.g. some questions related with water tax incomes with UK, or some water exploration allowances or royalties). It is important to remember that Scotland has more stored water than any other part of UK. More than the historical desire for Independence, Scotland does not like so much the controversial result and victory of the LEAVE inside UK Referendum. The consolidation of Brexit process could stress even more main political positions, very likely the water issue.

Showing a bit more about Scottish side of this analysis, the Scottish water policy is significantly technical, aiming a comprehension, a management and an accurate identification of water quality levels. However, Scotland's water policy touches into a polemical issue when we search about the power of different Scottish water social groups or actors. The existence of powerful groups that may influence the strategical actions and centralized the water political directions could be a weakness point of Scotland water policy. Nonetheless, Brazil has this same weakness political aspect as well, which we should describe this analytical aspect as a common characteristic of general water policies scope.

5. Water Is an Important Issue for Whom?

The comprehension of the water policies actions is a key element to understand the ideas and aims of territorial actors and policies. When we are describing the Scotland and Brazil study cases, a first way to develop this sort of comprehension is understand the aspects of primary production (agriculture) inside each country. Brazil and Scotland have the livestock sector as an important element of influence into water policies issues despite of each country has different dimensions about its land properties. Livestock sector is a main water consumer (especially because this sector maintains or even rise up its cattle fields). In Brazil, the livestock main activities are the production of cattle meat, chicken and pig, and in Scotland, its activities are mainly related with dairy farmers sector despite of the relevant cattle meat production at Highlands region and the presence of chicken and pig livestock as well. That is a similar point about these two countries. Another important aspect (when we are emphasizing the primary sector) is the existence of a strong landowner "aristocracy" which has the land ownership (this group is composed by important families, clans and powerful enterprises). This "aristocracy" select landowner groups (Brazil and Scotland) and have main influence into water policies discussions though land associations, private land institutes and syndicates as well.

Showing some data about land concentration, it is important to recognise that 76% of Scotland lands are owned by 8% of Scotland landowners, however, 52% of Scotland landowners have only 1.6% of Scotland lands (Economic Report on Scottish Agriculture 2014, p. 7-8). On the other hand, Brazil has the largest land concentration of the planet, with some landowners that have properties with an equally size of European little countries, properties which have more than one million of hectares, in Mato Grosso State, for example. These landowners are representatives of local rural syndicates, which have a powerful influence into every Brazilian River Basin Committee. This way, Brazilian agribusiness sector has a powerful and undeniable influence into water policies actions in all geographical scales of action. Water policies reveal a pure political side (which is strongly related with the global economic "handbook"). It is not only a technical matter indeed.

In order to elucidate the Scottish Agriculture sector, that is highly subsidized nowadays, and without this subsidization, the sector profits would be really smaller or could have a negative balance (Economic Report on Scottish Agriculture 2014, p. 19, chart 3.5). Few sectors could show some profit without a subsidization action by government as dairy farmers sector or cropping farms. The dairy farmers sector is in a light better situation, which are geographically located at centre-south, east and Borders regions in its majority (Economic Report on Scottish Agriculture, map 5, p. 11, 2014).

When we describe about the properties values in Scotland, the most values ones are located in Lowlands (south, centre-south and Borders region) and into the East Coast region (at Edinburgh-Aberdeen corridor until Inverness City region). It is important to show the strategical importance of Dumfries and Galloway and Ayrshire regions when we are describing about milk cattle (Economic Report on Scottish Agriculture 2014 p. 53, chart 5.5). About cattle meat sector in particular, Grampian's and Highlands have a mainly importance. This is an important Scottish group which has some influence into Scotland water resources actions.

About Brazil, when we are discussing about Brazilian Agriculture sector, it is important to show the strength of cattle meat sector, soybean and corn crop fields (which ones are deeply linked with cattle meat sector), and also the Brazilian rising sector of sugar cane (for producing ethanol fuel and energy). According to the Brazilian Ministry of Agriculture, Livestock and Supplies [MAPA Brazil] (2012), Brazil produced roughly 60 million tons of corn in 2015 and it will be producing 70 millions of tons of corn grain in 2021. The production of soybean reached 72 million tons of soybean grain in 2015 and its perspective for 2021 is nearly 89 million tons. The production of sugar cane is increasing very fast with an expansion of 6,7 million hectares in sugar cane fields, with a perspective of 29 million tons of sugar cane until 2021. At last, cattle meat, pig and chicken production is rising at the same way. That is an undeniable evidence that this sector has a powerful influence inside Brazilian water policies.

Besides, that is important to show that 59% of Scottish Land is rough grazing (Economic Report on Scottish Agriculture 2014, p. 90, chart 8.1). Scottish production has the following percentages: 42% of its production comes from livestock sector, 33% comes from grain fields, 16% of country production is livestock products and 10% come from other activities (Economic Report on Scottish Agriculture, 2014, p. 94, chart 8.4). Despite of Scotland territory be constituted by 59% of rough grazing, the landowner average profits are only worse than the England average (£30,000 pounds annual). The fact that the agribusiness sector is highly subsidized inserts the Scottish Government into a main role when we are discussing

about water policies in Scotland.

Another important Scotland "water actor" is malt and whisky sector, which is strongly entangled by its water policy. Famous worldwide, this important activity is meaningful to Scotland's culture. Another strategical activity to Scottish water policies activities is the fishing sector, which is best related with salmon and trout production. Notably, salmon production can be divided between the production from salt-water areas (east and north shores of Scotland) and river and lake areas through all Scotland regions. In Brazil, although distilleries are cultural important elements (e.g. "Cachaça" artisans), they do not have the same power influence in Brazilian water policy scope nowadays. In Brazil, fishing sector does not have the same power of influence than Scotland on water policies strategies, however, Brazilian Government has a particular Ministry for this sector (Brazilian Fishing and Aquaculture Ministry) and this country wants to develop intensively this sector, which is still being partially undeveloped, besides being the country with the Earth largest water potential scope.

In Brazil, when we are discussing about soils, the critical point is the presence of low fertile lands aggravated by high erosional rates. According to the Brazilian Society for the Advancement of Science [SBPC] (2012), there is an estimative of 822 million tons of fertile soils losses every year in Brazil, which 751 million tons of soil losses within cropping areas and 71 million tons of soil losses at cattle field areas. This matter is entangled with the historical forest deforestation, and it is a direct threat against Brazilian's tasks and plans about its water policies development.

There are two other sectors that should be considered into this analysis: the industrial and energetical sectors. Industrial sector uses more quantities of potable water and energy then residential sector activities. In Scotland, geographically, the Edinburgh-Glasgow corridor and Glasgow metropolitan area are the best examples of water industrial uses in Scotland. In Brazil, the strongest industrial areas are in Rio de Janeiro – Sao Paulo metropolitan area or the traditional "Triangle Area" composed by Rio de Janeiro – Sao Paulo – Belo Horizonte, regions that are industrial areas since 1950 ́s at Getulio Vargas second period of government (Skidmore, 1967). However, there are other relevant industrial areas in Brazil, like Curitiba, Recife, Salvador, Porto Alegre, Fortaleza, among others regional capitals. Industrial sectors are often present at water policies discussions with the role of industrial associations. If we are explaining the energy sector, the region of Aberdeen (Aberdeenshire and City of Aberdeen) highlights as the major energetic producer region. Scotland has a variable energetic park, with modern eolic windmills, hydro power plants (145 hydroelectric plants by Highlands and Islands of Scotland). Thermal power plants are almost closed. More than that, the petrochemical sector and its main importance to Scotland has a significant role inside the water policy scope and nation economical scope, because it is supporting some negative income tax from other state sectors (e.g. agricultural sector which is highly subsidized by Scottish Government). Aberdeen region and the North Sea petroleum sector provides Scotland of gas, energy and maintains part of economic health of United Kingdom, with its annual profits. On the other hand, Brazil still has a strong dependence of its hydroelectric power system, which is extremely dependent of Brazilian territory pluviometrical rhythm. When Brazil suffers with long periods of drought, it rises the utilization of thermoelectric power plants (which are much more expensive and provoke higher levels of air pollution). Brazilian eolic and solar sector is being developed nowadays, with some experiences into Northeast region (at Rio Grande do Norte and Ceara State). It is relevant to show that Brazil is strengthening alternative sources of energy with the development of eolic and solar energy sectors at last (see http://www.brasil.gov.br/infraestrutura/2016/01/brasil-estara-entre-os-20-paises-com-maior-geracao-solar-em-2018 and http://www.brasil.gov.br/infraestrutura/2016/01/brasil-sobe-5-posicoes-em-ranking-mundial-eolico). In each country, the energy sector is a core one inside water policies actions (petroleum sector in Scotland and hydroelectric sector in Brazil).

Eventually, another relevant point is the social participation inside water policies actions in each country. We can observe that in spite of all efforts towards the decentralization of water policies, the power influence of social groups and NGOs are more rhetorical then practical and real. These groups do not have the same power of the government sphere or powerful market groups as petrochemical and energy sectors or rural associations. However, the social groups are the major ones to be called to save water in critical periods, despite this sector is not the major responsible for the massive spend of potable water. In fact, this is a kind of myth or a strategical prejudice, highly suitable by powerful groups that use much more potable water stores. This fact revels the extremely aggressive behaviour of global market sectors, which is always linked with the Government spheres. The pure technical development of water management system must not be the unique way of action without an ethical and moral reflection about the social water access, even though technical proceedings being very relevant to achieve substantial results inside water policies scope.

Seeking for some political and ideological aspects about water policies (thinking about the social aspects on water resources), a relevant concept to be shown is the environmental ideological context between north *versus* south globe hemispheres (this aspect is quoted by Doyle & McEachern, 1998, note 5). Inside this concept meaning, Brazil government has a speech that aims the struggle against poverty allied with hydric and environmental conservation. Notwithstanding, Scotland has a traditional technical speech which is the concerning with a less polluted water, searching for better levels of water quality. Brazil has a clearer social tendency on its environmental speech, whilst Scotland has a technical tendency

on its one.

When we are analysing a dialectical relation between environment and water policy this one seems to be more critical by Brazilian side. Brazil has a territory hundred times larger than Scotland, which the Amazon Bioma is located along at a half of its extension. Inside this bioma there is the biggest world rain forest which contributes to main quantities of rain in South America. There are many academic studies about Brazil that believe in a real hydric crisis threat on Brazilian territory if Amazon deforestation process keeps going on. As we can see in Lovejoy & Salati (1983), Walker et. al. (1995), Gash et. al. (1996), Marengo (2007), among others. Another water and climatic threat for Brazil is based on strategies related to its own energetic development. Brazil wants to strength its hydro-energetic sources in the next decades, planning to build new hydro power plants, but it has a highly risk level for the environment.

Thinking about Scotland, this country seems to be one of the most advanced countries about water policies scope inside the European context. Thus, Scotland has a very good water quality level, specially when we describe the water quality level of Highlands or Grampian's regions. The major Scottish focus is the protection of its water quality, aiming the protection of its economy production and its own history. In other words, while Brazil has many concerns about its water actions management (avoiding deforestation and protecting its forests, monitoring its water quality level, developing its River Basin Committees actions), Scotland has the central focus of developing its water monitoring and management system, seeking for accomplish of Water Framework Directives (WFD) specifications, trying to achieve its Hydro Nation goals and expected results.

6. Some Results of the Comparative Analysis

After a briefly explanation about political and even geographical aspects within Brazil and Scotland Water Policies, we can reach to some results at tables 2 and 3:

Table 2. Some results of Brazil and Scotland water policies aspects matrice

Good Aspects	**Conflictive Aspects**	**Good Aspects**	**Conflictive Aspects**
existence of good structure of laws for a reasonable water policy development; existence of a huge water potential into Brazilian territory; start of the creation of technical levels of the actions strength from social groups and actions related to water become the concept of sustainability more applicable	there is still lack of infrastructure to be applied within the policy actions; shortage of know-how to develop technical and methodological actions; excessive favouring of powerful political and economic groups; cannot apply the actions when needed and cannot develop the water sector properly; administrative and technical sectors conflicts inside water policies management; lack of data about water resources, even nowadays (2016).	good technical level of management within river basins; good level of pragmatism at water policy actions; existence of water with a higher quality in its territory; becoming the concept of sustainability more applicable.	tendency of centralization of the policy actions; excessive favouring of powerful political and economic groups; past conflicts with other European nations about environment issues (in a British scope); break with the European Union (Brexit) with a possible difficulties of dialogue with EU Members and Commissions; possible difficulties of dialogue with other regions and sectors within UK, especially after Brexit process; possible future rupture with United Kingdom.

Table 3. Key-aspects between Brazil and Scotland water policies scope

- Brazilian Environmental Water Laws are well developed, however, they need a better technical structure for a more efficient water policy application;	- Although a better technical structure is always a goal to reach, this point is a positive one at Scottish water actions;
- Agribusiness sector is the strongest water sector inside Brazilian water policies. Brazilian Energy sector (hydro-energy) is another very influential sector within water policies actions;	- Petrochemical sector has the main influence inside Scottish water actions. We can show, also, agribusiness sector (dairy and crop fields), fishery sector and the Glasgow-Edinburgh industrial area as another very relevant sectors about water policies in Scotland;
- Energy sector is very dependent of Brazilian water policy results (and vice-versa), which might be a future risk to the country;	- Energy sector is partially dependent of Scottish water actions. Also, Scotland is showing a tendency for hydroelectric sector expansion;
- Brazil is a large country and its water policy must have a macro-scale scope. This condition gives to its water policy a complex and expensive aspect;	- Scotland has not a large territory, even by European standards. This aspect could allow a higher technical level, specially into logistical proceedings;
- Low administrative and technical knowledge by water technicians is a threat. This aspect could explain why federal, provincial and river basin committees are not enough structured yet;	- Better comprehension of technical and administrative scope of action exists because of its water institutions development and know how;
- Despite of Brazilian Water Law valorizes a decentralized water policy scope, its water policy still has a centralized aspect strengthen by traditional powerful groups (agribusiness and entrepreneur groups). Nonetheless, Brazil searches for a deeper social emphasis inside its water policy scope, aiming for the decentralization achievement;	- Scottish water policy actions are influenced by powerful groups (petrochemical sector, energy sector, dairy sector, salmon and fishering associations, industrial sector).
- Government sector has a main position and influence within strategical actions because it still must develop its water technical proceedings. This proceeding aims to strength Brazilian water institutes and River Basin Committees.	- Scottish government subsidizes agribusiness sector, which gives this sector a main position and influence into water policies development as well.

7. Conclusions

Brazil and Scotland are two nations that valorize their water policies and they are staying focused on their strategical water policy actions. Moreover, these two nations have a main geostrategic importance related to water issues (Brazil because its unique freshwater potential, and Scotland because its international famous water quality). However, one of the most important differences that we have found is that Brazil has a chronic problem about the technical monitoring and managering of its water system. While, Scotland has more pragmatism about its monitoring and managering technical efforts about its water system (which could be explained because the national project of Hydro Nation). Brazilian water diagnosis development is a hard task (because of its geographical scale and environment configuration), and for this reason, this country should have a careful elaboration of its technical and methodological expertise to become more efficient its water system. This huge challenge contrast with a very good Brazilian aspect about this matter, which is a comprehensive and good amount of environmental laws at this country.

On other hand, Scotland may have a concern about its actual political situation with the victory of LEAVE at 2016 UK Referendum and the formalization of Brexit process, if we want to explain about its Hydro Nation project. Brexit might impact Scottish water policy: 1) weakening the Scottish position against UK (Scotland vote for REMAIN with a proportion of 70% to 30%); 2) strengthening the traditional Scottish desire to become an independent country (which certainly would create a tension with UK-Scotland relationships and a very likely new approximation with EU), and 3) strengthening a political isolation of UK and Scotland beyond Europe. That's important to say that Scotland wants to be a world leader in water management know-how and this country wants to really avoid this kind of political isolation to Europe as well. This entire context could fortify a geopolitical tension between Scotland and UK, and that's good to

remember that Scotland territory has the major part of UK water resources.

At last, it is relevant to bold that Brazil and Scotland have both a centralized agrarian configuration, which a rich and powerful social class has the major portion of the land properties. This aristocracy has a very influent power of decision within each water policy State. For this reason, the dialectic water policy nature *versus* land use processes and domain has a remarkable similarity within these two countries (not forgetting the differences of geographical scale between Brazil and Scotland indeed). Nevertheless, we should explain here, that this fact is a traditional and even an axiological aspect, when we are discussing about water policies. Water policies often represents the interests of landowners and the power of influence of this group inside State questions. However, water policies represent the interests of many other social groups whose argue and claim against powerful landowners influence and/or some State strategies and tendencies.

Notes

Note 1. General concept of water governance: "Water governance refers to the range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society". (Global Water Partnership, 2002).

Note 2. Concept of Hydro Nation – "*The concept of Hydro Nation is a strategical geopolitical action of Scotland inside Europe and World context. Scotland wants to use its huge water potential to deliver economic gain to Scotland, help tackle climate change, raise Scotland's international profile, and share knowledge on water issues*". (Scotland, the Hydro Nation, 2012).

Note 3. Stockholm Declaration, principle 2: principle which shows that natural resources of the planet (air, water, biodiversity) must be protected for the good of present and future generations, through a well-developed planning and management process.

Note 4. Scotland began to develop its water policy at 1999, with the reactivation of Scottish Parliament, which was closed since the Treat of Union in 1707. Before 1999, the water regulations had been created by British Parliament in London. United Kingdom had a really difficult task to accept the European Union environmental and water decrees between the 1990´s (Lowe & Ward, 1998). After 1999 with the Scottish Parliament return and after 2000 with an officiation of Directive 2000/60/EC, Scotland is having an interesting political context to develop its water policy better then with United Kingdom all together, starting to plan its project of Hydro Nation.

Note 5. According to Doyle & McEachern (1998), the most important Northern Hemisphere matters related to environmental issues are demographic control, species extinction, climate change or negative environmental, and in Southern Hemisphere the most relevant highlights inside environmental speech are about the social quality of life and the struggle against the poverty levels.

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