

Study of Water Resources Plans as a tool in the Management of Integrated Watershed

Etude des plans de ressources en eau comme instrument dans la gestion intégrée des bassins versants

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RÉSUMÉ

Les problèmes de pénuries d'eau ainsi que les inondations sont des phénomènes alarmants. En effet, les inondations causent chaque année de nombreux décès à travers le monde, laissant les autorités en manque de moyens et de solutions. Ces phénomènes provoquent au sein des gouvernements un fort investissement afin de lutter contre ce genre de catastrophes. En ce moment, se tient un consensus mondial qui atteste que la meilleure alternative pour la gestion des ressources en eau est une approche intégrée. Cette dernière associe divers domaines et niveaux de connaissances ainsi que plusieurs organisations politiques pour la conservation de la quantité et de la qualité de l'eau. Ainsi, l'article présente une analyse des principaux plans de bassins fluviaux brésiliens. Ils sont vus comme des instruments de gestion intégrée des ressources en eau. Le Brésil a élaboré des stratégies ciblées pour répondre aux défis de l'eau : tout d'abord par les régions et ensuite par la décentralisation et la participation des utilisateurs et organismes au niveau du bassin. L'approvisionnement en eau et le partage des coûts basés sur le principe du pollueur-payeur sont également des approches progressives déjà utilisées au Brésil. En général, il y a un développement superficiel des plans des bassins. L'intérêt politique joue un rôle de frein dans cet enjeu environnemental et lève la question de l'impartialité des plans.

ABSTRACT

The water scarcity issues and floods are alarming and victimizing many people around the world letting the authorities on alert, which is promoting investments in the area. Nowadays, it is a global consensus that the best alternative for Water Resources Management is the integrated approach, which combines several areas of knowledge and political organization levels for the maintenance of adequate quantity and quality of water. Therefore, the article presents an analysis of the main Brazilian water resource plans as tools for Integrated Water Resources Management. Brazil has elaborated strategies oriented to approach the challenges of water by regions, decentralization through user participation and organisms at a basin level such as the basin committees. The water concession and cost sharing based on the user-pay principle are also progressive approaches already used in Brazilian territory. In general, it is noted a superficial manner of elaborating basin plans and the interference of political interests has been causing a problem to the quality and impartiality of the plans.

KEYWORDS

Integrated Water Resources Management, Water Resources Plan, Basin Committees

1 INTRODUCTION

The debureaucratization of water resources management has been increasingly applied on the national agencies to give a new approach to the relative aspects of water resources. One of the main tools to Integrated Water Resources Management is the basin plans, which in summary are defined as studies about the characteristics of the watershed and a maintenance planning for quality and quantity of water resources available on it (Marlow *et al*, 2013). These plans are present in the majority of countries, representing a potential library for studies on the subject and consequently enable the improvement in the development of new plans.

2 METHODOLOGY

The article presents an analysis of five watershed plans from the most populous regions of Brazil. It was analyzed the following basin plans: Velhas River (central region of the state of Minas Gerais with area of 29.173 km²), Doce River (between the states of Minas Gerais and Espírito Santo with area of 83.400 km²), Araguari River (west region of the state of Minas Gerais with area of 22.091 km²), Sapucaí River (south region of the state of Minas Gerais with area of 8.824 km²), and the Piracicaba, Capivari and Jundiá Rivers (between the states of São Paulo and Minas Gerais with area of 15.303,67 km²). The target audience of these plans includes managers in the area of water resources.

The study consists in an analysis of five phases which guide the basin plans studied. The first phase basically defines the goals of the plan, the organizational arrangement, the social participation and the planning horizon. In the studied plans were mainly analyzed the technical team and the goal which are defined at this stage. The second phase consists in a survey of the basin characteristics, the use and occupation of land, the population involved, the environmental sanitation infrastructure and diagnosis of demands and water availability. The quality of the information described in this phase is a reflection of the studies developed in the basin. In the third phase, it is created scenarios of future demands, compatibility measures between availability and water demands, and coordination and harmonization of internal and external watershed interests. Good plans should use mathematical models in this stage. In the fourth phase, propositions related to water resources are created, and in the fifth is established the manner in which the proposals will be implemented. The society participation in these steps is required, because it will be the main impacted by these proposals.

3 RESULTS

It is extremely important for the development of basin plans the participation of scholars from several areas of knowledge and also of the community in which the basin is inserted. According to Saleth & Dinar (1999), Brazil is a country which has succeeded in this regard with the creation of basin committees. However, in practice this is not always working, since the first phase which defines among other things the technical team which will prepare the plan has been neglected in some plans. For instance, it can be mentioned the Velhas River basin plan in the state of Minas Gerais. From the 14 members of technical team which elaborated the plan, there was only one biologist and no environmental engineer. In addition, from the 8 members of the technical commission there were not biologists, geographers and environmental engineers but there was one medicine professional. On the other hand, in the Piracicaba, Capivari and Jundiá Rivers the formation of staff is not clear, which can mask the use of inadequate professionals.

In the second phase, it is common the use of secondary data for elaboration of studies, such as in Sapucaí River Plan. These data can sometimes be outdated, but there is often not enough time and financial resources to conduct all the studies along the watershed coverage area. In the third phase, the use of mathematical models to forecast future scenarios was used in the Velhas River Plan, for example, to do simulations for scenarios with different characteristics, but the same cannot be seen in the Piracicaba, Capivari and Jundiá Rivers Plan. The fourth and fifth phases are addressed concisely in all studied plans.

Brazil also included water as an economic approach focused on the water resources integrated management, developed strategies oriented to approach the challenges of water by regions, decentralization through user participation and organisms at a basin level such as the basin committees. The water concession and cost sharing based on the user-pay principle are also

progressive approaches already used in Brazilian territory.

The water resources integrated management is the approach currently used in Brazil that seeks to conciliate several organizational levels in the basin committees and in elaboration of the plans. Therefore, many actors are involved, such as professionals in the field, politicians, entrepreneurs, agriculture and livestock workers, industrialists, riverside communities and population of the cities located within the limits of the basin. Everyone has an active voice and can participate with proposals and plans so that the whole community is benefited and the water resource is preserved in its quality and quantity.

Another innovation in Brazil is that the basin committee as well as responsible for elaborating the basin plan it is also able to decide and apply rates for the use of water. In basins which do not have plans, which is very common in the country due to its large extension and also the lack of qualified human resources, there are no charges, that is, the currently existing granting of permits for the use of water in these areas does not include any payment. Since the basin plans are developed and the rates for the use of water start to be applied, two phenomena are consequential: the increasing awareness of users about the preponderant water uses and greater financial wherewithal for the committee to invest in improvements to basin management.

An example of charging for the use of water resources occurs in the Rio Doce Basin. In 2011, the basin committee started charging for water abstraction (0.0009 dollar per cubic meter), transposition (0.011 dollar per cubic meter) and for effluent discharge (0.05 dollar per kilogram of BOD). The National Water Agency transfers the amount collected to the Atlantic Bio Institute, an organization chosen by the basin committee that carries out work in biodiversity conservation inserted in the basin (ANA, 2011).

4 CONCLUSION

It is observed in Brazil the elaboration of superficial basin plans, and professionals who have conducted these studies are often not the most qualified, as well as the interference of political interests has been a problem in quality and impartiality of the plans.

The best ways to increase the quality of basin plans are: professionals from several fields related and important for this type of study, participation of involved and interested actors, availability of financial resources, and finally, experience in producing the plans. As noted, some plans have good characterizations in some parts and not so good in others, so the experience exchange between the basin committees and the managers of the area could minimize this problem.

In order to acquire this experience, we can cite the study of basin plans as a cheap, easy and appropriate task. Comparison with different and similar realities brings ideas and innovations which can be applied in ongoing studies. As a result, new integrated plans are elaborated, bringing improvements to basins and also ensuring water availability for future generations.

LIST OF REFERENCES

- ANA (Org.). Cadastro Nacional de Usuários de Recursos Hídricos. Available in: <<http://www2.ana.gov.br/Paginas/servicos/cadastrs/cnarh.aspx>>. Access: 16 mar. 2014.
- Marlow, D. R. et al. (2013). Towards sustainable urban water management: A critical reassessment. *Water Research*, Vol. 47, n. -, Austrália, 7150-7161.
- Saleth, R. M and Dinar, A. (Ed.). (1999). *Water challenge and institutional response: a cross-country perspective*. California Digitized 23 Jun 2008: World Bank, Development Research Group, Rural Development And Rural Development Department, Washington, DC. 51.