Education: Essential Approach For
A Better Water Management

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Abstract

Management and water conservation is in the heart of the concerns of all stakeholders, government, scientists and socio-economic observers...Actually scientific researches around the world derive from more alarm about the future of this vital source, increasingly scarce and threats it faces from all sides. In this movement, the role of education is fundamental. Indeed, we cannot train people aware of the water's problematic and thus able to behave in rational water users and managers without the intervention of educational systems. Questioning at the origin of this work is "what about the Moroccan education system?" As the backbone of any educational system is the Curricula, an analytical study of the theme of water in the curriculum is essential. The work presented here is an analysis of the curriculum at the college (Middle School). Our choice of placing the study at the Middle School is based on the fact that; on the one hand, it is at this level that have laid the basis for further scientific knowledge, and on the other hand student is living in this period a transition on several levels: physiological, psychological and cognitive. This change will certainly influence the teaching-learning process about the issue of "Water". As the water theme is interdisciplinary, we analyzed all the programs of the various disciplines: Arabic Language, French Language, Physics, Chemistry, Biology-Geology, Islamic Education, Geography and Citizenship Education. At the end of this study, we were able to have an overview of the current situation, to draw some preliminary conclusions and propose recommendations in perspectives.

Keywords: Water, Education, curricula, preliminary

1. Introduction

Water Management and conservation are at the heart of the concerns of all governmental, scientific and socio –
economic stakeholders and observers ... Indeed, scientific research around the world sound the alarm about the future of this vital source, increasingly rare. Although the causes behind such critical situation are multiple, we can state that pollution and overuse are the most destructive and adverse factors on the future of water sources. Therefore, environmental education in general, and water education in particular provide a means of struggle to be considered in this problematic. (Bouchouata et al., 2012). In fact, this work aims to verify the role of education as a tool for a better water management. The analysis of some recently established strategic programs to solve the "Water" problematic allowed us to clearly demonstrate the direct involvement of education in the success of these latter.(Koukal et al., 2004.).

2. Materials and Methods

To develop through education as an approach to solving problems relating to water, we did an analysis of the following programs:

- National Programs
  - National Report on Water Resources in Morocco
  - National Water Strategy
  - National Charter for Environment and Sustainable Development
  - Junior High School Curricula
  - International Hydrological Programme (IHP) of UNESCO

3. Results

- National Report on Water Resources in Morocco
  Among the report's recommendations include:
  "Improving knowledge in the fields of hydrometeorological forecasting, monitoring, and control of water resources."
  (Bzioui, 2004)

- National Water Strategy
  To address the most pressing problems and make water a decisive factor in our sustainable development; Morocco has implemented the national water strategy.
  As regards the reform of the institutional and legal framework, we underline this first reform:
  "A water administration renewed and strengthened, including through the integration and training for new water professions (engineering, finance, management, human resources, soliciting donors, financial engineering, communication...)"
  (Benhiba, 2010)

- National Charter for Environment and Sustainable Development
  In the same process, and in order to merge all previous strategies, Morocco will establish the "National Charter for Environment and Sustainable Development". The latter is based on several values and principles, which include education in the first place:
  "Governments, economic and social actors with the participation of the civil society ensure the achievement of the objective of sustainable development, which is of general interest and for which the protection and enhancement of the environment are factors of social and economic progress.
  Such progress must be based in particular on social solidarity, territorial and intergenerational. It must also be based on social and political involvement of women in economic life, as well as the education and training of young people and the development of local communities"
  (charte nationale de l'environnement et du développement durable, 2011)

- International Hydrological Programme (IHP) of UNESCO
  UNESCO is based on education to succeed the goals related to water, in fact it has implemented the International Hydrological Programme (IHP). Among the major themes of the program, we find "Education related to water for sustainable development" Among the conclusions of this action, we note that the UNESCO criticize
curricula: "Educational programs should therefore form a new generation of managers and decision makers who are able to apply a multidisciplinary and holistic approach to water resources." (UNESCO, 2014)

Junior High School Curricula

In the following table, we present the main themes addressed by the different subjects on the issue of "Water" during the three years of junior high school.

| Subject                  | Contents                                                  |
|--------------------------|-----------------------------------------------------------|
| Arabic                   | • Text: The Environment and Health                        |
|                          | • Text: Wasting water                                      |
| French                   | • Document (Poster): In the Sahel, 40 000 km² of life lost each year |
|                          | • Text: Educating for the environment                      |
|                          | • Text: Learning from the "Prestige"                       |
|                          | • Text: Attention! No water, no life.                      |
|                          | • Text: (correspondence from a reader)                     |
| Physics and Chemistry    | • The water in nature                                     |
|                          | • Water treatment                                          |
|                          | • Water Pollution                                          |
| Geography                | • Terrestrial and aquatic areas                           |
|                          | • The atmosphere                                          |
|                          | • Folder: peaceful Exploitation of the Sea                |
|                          | • The various internal resources of Morocco               |
|                          | • Feature: desertification in Morocco                     |
| Islamic Education        | • Importance of Islam for the environment                 |
|                          | • Water and life                                           |
|                          | • Protection of the environment in the Islamic heritage   |
|                          | • Fight against pollution                                  |
| Biology-Geology          | • The presence of the forms of water in nature             |
|                          | • Ground water reserved in rocks                           |
|                          | • The aquifer and the water cycle in nature                |
|                          | • Dangers killing aquatic resources                        |
|                          | • Techniques for water treatment                           |
| Citizenship              | • Protection of natural resources                          |

4. Discussions

In secondary school, the theme is explored in all its facets: water as an energy source, water as an environment and source of life, water as a resource of energy, water as a dynamic landscape element, chemical composition and properties of water, needs and water resources, supply and sanitation techniques. The theme of water is not privileged in the activities of education for citizenship, a material that is supposed to transmit values of awareness in the third year of secondary school. The quasi absence of the theme of water in language classes is a major obstacle for students. These latter, would not have the opportunity to discuss and exchange ideas related to water. The absence of the subject «Education related to the environment" is a large gap in the educational system, since it guarantees the success of the teaching-learning process in relation to water management.
5. Conclusion

The analysis of the recommendations of the three national programs, as well as the UNESCO ones clearly show that any political approach to solve, improve or propose solutions to address the issue of "Water" should supervene through education and certainly via curricula.

References

Benbiba, 2010, Stratégienationale de l’eau, Water in Mediterranean countries: Problems and Solutions.
Bouchouata, O., Ouadarri, H., El Abidi, A., El Morhit, M., Attarassi, B., 2012. Bioaccumulation des métauxlourds par les cultures maraîchères au niveau dubassin de Sebou (Maroc). Bulletin de l’InstitutScientifique, section Sciences dela Vie, Rabat 34 (2), 187–201.
Bzioui, 2004, UN Water-Africa, Rapport national sur les resources en eau au Maroc.
Chartenationale de l’environnementet du développement durable, 2011, Secrétariat d’état chargé de l’eau et de l’environnement au Maroc.
Koukal, B., Dominik, J., Vignati, D., Arpagaus, P., Santiago, S., Ouddane, B., Benaabidate, L., 2004. Assessment of water quality and toxicity of polluted Rivers Fez and Sebou in the region of Fez (Morocco). Environ. Pollut. 131, 163–172.
UNESCO, 2014, UNESCO’s Intergovernmental Scientific Cooperative Programme in Hydrology and Water Resources.