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Morocco, Factor 2: Water scarcity

Morocco is a nation known by its semi-arid climate and its population growth. Today, it is still facing a serious situation of hydraulic stress. At the same time its socio-economic development requires mobilization of increasing water resources. Since the 60s and the construction of large dams, led by King Hassan II, Morocco has committed significant investments to mobilize the necessary resources. In this regard, the efforts shown by Morocco since 1995 and the establishment of the rural drinking water supply program has enabled an investment of nearly 15 billion dirhams and achieved a rate of access to drinking water in rural areas of more than 93% at the end of 2012 (Douiri, 2013). However, according to a report by the Moroccan High Commission for Water, Forests and the Fight against Desertification (2012), Morocco has taken the step to move from the lack to the scarcity in water, adding that by 2020 the share of water for every citizen will be reduced by 49%, which means that Moroccan citizens will have only less than 400 cubic meters over the next six years.

According to Green Morocco Strategy (GMS), since the early 1980s Morocco has been working on developing strategies to improve the agricultural productivity and practices – since its natural resources are being threatened of degradation as for water – to get into the market competition and to alleviate poverty. The GMS objectives are to ameliorate crops grown and develop more strategic crops, which are well adapted for market mechanisms. In order to accomplish these objectives, the GMS facilitates for private investment and ensures equity, and the development of a new approach oriented to poverty alleviation for specific zones and specific communities. “One of the most important challenges to be targeted by GMS is the implementation of new institutional reforms to face the water deficit” (GMS, 115). During the Agadir congress a few years ago, in order to improve water pricing and water distribution for needs in Morocco, the GMS strategy insisted on the measures for different water issues and the delegated management of water for irrigation, collection, treatment and hydraulic investment.

Due to the hydraulic stress that Morocco is facing today, the agriculture is also threatened. In order to find solutions, we must answer the following questions: What are the size, composition and diet of a farm family in Morocco? How does Morocco manage crops grown and practice agriculture? How does water shortage affect life quality and agricultural productivity in Morocco? How severe is the situation? What measures has Morocco taken so far? How will resolving water scarcity affect the country and what are the solutions for it?

A Moroccan family, on average, is a considerably large family. A family in Morocco typically consists of the father; whose privilege it is to decide independently of everything and to ensure all the needs of his family, he also represents authority and power, leaves the house the whole day for work, he can either be a merchant, craftsman, land owner, or a member of Makhzan or scientist and teacher. The mother; whose only duty it is to educate and take care of the children and to accomplish household chores. Children (on average from 4 to 12) either go to Msid (religious school) or to a public school in town. To help maintain a healthy and active family, food is considered the most important factor. The main elements in Moroccan meals and dishes are bread, water and olive oil. A Moroccan farm family's diet consists of healthy food elements only, such as vegetables, fruits, oils, lentils, beans, meat and water, which are grown in very big farms in specific parts of Morocco. The agriculture in Morocco is based in two areas. Barley, wheat and other cereals are more likely to grow without irrigation in the rainy sections of the northwest. Big quantities of olives, citrus, fruits and grapes are

sown in vast plains on the Atlantic coast, where water is supplied by artesian wells. Additionally, the Moroccan agriculture also produces oranges, tomatoes, potatoes, olives and olive oil.

According to Food and Ag policy and U.S. Department of Agriculture, farmers and ranchers across the U.S. recognize that healthy soils and watersheds are critical to the productivity and profitability of agricultural systems, as well as to rural communities and wildlife. Innovative modern farmers are trying new techniques to save topsoil such as planting ryegrass on fallow fields to fight erosion, or leaving buffer strips of native grass to prevent top soil runoff, to conserve water (by terracing, and tiling), and to maximize production by collecting highly usable data on every plot of land. Yet, even with increased effort and new methods, topsoil is lost to wind and flood and organic matter is depleted. In addition to these, chemical run-off from pesticides and fertilizers, as well as chemical contamination from oil and other mining, threaten to break down the natural systems on which agricultural communities and wildlife depend, such as hive extinction in bees and drought (U.S. Department of Agriculture, 2011).

Our resources (water, soil) will be under increased pressure as population rises, housing and development occupies agricultural land, food and biofuel demand rises, and climate change progresses decreasing available water and arable land. We know our planet is changing, and to make sure that our environment can support the population, we need policies and laws that protect and improve soil conditions, water supplies, and other resources essential to humans. Americans (or Iowans) must begin with changes here; once these technologies and environmental methods are demonstrated and successful, they will spread to other countries and regions, benefiting all peoples. (U.S. Department of Agriculture. 2011)

Nobel Prize laureate in Physiology Albert Szent-Györgyi (1893-1986) once said, “Water is life's mater and matrix, mother and medium. There is no life without water.” It is more than obvious that food and agriculture are the largest consumers of water, requiring one hundred times more than we use for personal needs. Therefore, for vegetative growth and development as in Morocco, plants require water in adequate quantity and at the right time. Crops have very specific water requirements, and these vary depending on local climate conditions. The production of meat requires between six and twenty times more water than cereals. The main point is that WATER is considered as major way to help improve the agricultural productivity such as crops grown and enforces agricultural practices in Morocco. In other words, the miserable situation of water scarcity and hydraulic stress that Moroccans are facing is to cause less productivity and eventual downfall of the Moroccan agriculture, which could ultimately lead to extreme food insecurity.

Experts are sounding the alarm; today they are all considering Morocco as a country whose water resources are threatened. If we are not careful, they say, the country is going straight to the shortage between 2020 and 2025, which means that water availability will go down irretrievably below the critical threshold of 500 cubic meters per capita with, of course, large disparities. In total, no less than 13 million Moroccans are experiencing lack. In another aspect, Morocco is stepping into water scarcity which can be defined as a severe-like situation for the country and its people. Therefore, the Moroccan future is somehow threatened.

In fact, and as a result of natural conditions of Morocco, both climate and relief, water losses are significant and serious. It is true that the demand for potable water is mobilizing more than 700 million cubic meters. The coverage rate is 80% in urban areas and 30% in rural areas where 70% of the population consumes less than 20 liters per day per citizen, which represents the sixth of the daily consumption of a city. Rains bring a volume estimated at 150 billion cubic meters, of which 80% s and

20% evaporate and infiltrate annually. Only 30 billion cubic meters can be considered as national water resources. This condition that Morocco is facing is largely due to its location. Indeed the Kingdom is distinguished by a high contrast with very erratic rainfall in space and time climate. Therefore, natural water resources are among the lowest in the world. Indeed, the potential of natural water resources are estimated at 22 billion cubic meters per year, equivalent to 730 cubic meters per citizen per year.

According to the Global Water Partnership (GWP, 2002), in Morocco, where water is growing more and more scarce, a National Water Plan has been implemented in order to reform institutions and enforce water policy. Realizing its water shortage problem, Morocco is looking ahead to 2020, and will use a long term plan to quit change and spending for Integrated Water Resources Management. This will require new legal framework in order to decentralize water management and increase participation by those who can cause the most change (i.e., stakeholders). Measures will have to be taken to increase the capacity of water management systems. Plus, effective monitoring and control will have to be implemented in order to protect Morocco's water and its environment.

In addition, Morocco has adopted an "interventionist" type of irrigation policy for LSI systems development to promote the sensible use of water and to make it easier for its people to participate and comply. The framework of this policy is spelled out by a variety of laws grouped in the "Code of Agricultural Investment" (1969). As Morocco invests in and improves the quality of its lands through irrigation and water policy, Morocco's farmers will be expected to comply with laws spelled out in the Code. These include: farming the irrigated land in the national interest, to follow the norms imposed for this hydraulic sector, and to "repay the State 40% of the investment costs and 100% of operation & maintenances costs through a land improvement tax and volumetric water charges." (GWP, 2002)

Resolving or preventing water shortage in Morocco will help maintain a secure life and future for its citizens in different domains; as it takes a lot of water to grow food and care for animals, providing good quality water must be the first step. Experts say that globally, we use 70% of our water sources for agriculture and irrigation and only 10% on domestic uses. Therefore, less water means farming and other crops that need water to grow have lower yield. In other words, preventing from water scarcity would also mean preventing from constant hunger and thirst and low quality of life.

Another domain in which resolving water scarcity will help is education. Although it may be hard to find mutual links between water and education, a lot of educational sides in Morocco have been affected by water shortage, too. Kids in poor, rural towns must walk for miles in order to get water regardless of the quality/quantity. They get tired and some have to miss school as a result. Doing this for many years takes away school times and the cycle continues. In some parts of Morocco, girls and women are not allowed to go to school at all, so that they can serve the family by getting water and taking care of other family needs. Providing water to these people would improve both education and country to a better status; distributing potable waters in small towns which water is either rare or not potable, providing water at school so kids will not have to miss school in order to quit being thirsty, digging wells in small towns, prevent from pollution, reconsidering the delegate management of water and reforming policies for water usage are places to start solving this problem.

"All are places where shortages of water contribute to poverty. They cause social hardship and impede development. They create tensions in conflict-prone regions. Too often, where we need water we find guns. [...] There is still enough water for all of us - but only so long as we keep it clean, use it more wisely, and share it fairly" (Ban Ki-moon, 2008). In addition to these domains, there is no doubt that preventing from water shortage will also have positive effects on the economic side of Morocco.

Providing water to the Moroccan communities will facilitate foreign investments and attract tourists as to restaurants, hotels and shopping places need to keep clean. Manufacturing activities, commercial farms, and mining processes all need a lot of water to thrive. If we work on taking care of the economic domain of Morocco, people will be in better situation. In other words, fighting against water scarcity is fighting against poverty.

Even if Morocco is today taking serious measures towards water shortage threatening, other factors, such as pollution, population growth, urbanization etc., are not giving up and still have bad influences for water. It is being polluted because of fumes coming out from the big number of factories today. Population growth will increase water scarcity since the need of water will increase too. Urbanization will trim the agricultural areas and reduce the agricultural productivity and practices, which will also minimize natural resources in Morocco.

Although water scarcity may not currently be a substantial problem to every country, many countries, such as Morocco, feel the effects of water scarcity and the issue must be addressed. In my opinion, facing water scarcity and improving food security in Morocco requires more than one solution. Desalinization, which filters salty water through membranes and remove the salt through electro dialysis and reverse osmosis, might be the first step to a first improvement regarding the issue of water scarcity. 'This procedure has worked for about 130 nations in North Africa and the Middle East. With this system, these nations are currently producing six billion gallons of usable water a day' (Arrandale, 2002). If water scarcity is really an issue, saving it is certainly a solution that can start with poor zones and individual homes by developing and mandating more efficient household water heaters. Old houses with poor insulation require time for heating up water from a faucet or a showerhead which can lead to a waste of water. Providing heated pipes and better insulation throughout the system would help lessen wasted water in poor zones.

In conclusion, given that Morocco is among the countries facing water stress but still not completely destroyed by it and as it has just woken up, serious measures and changes throughout the year are being considered. In other words, Morocco is a good example for a country that is working on solutions to prevent from water scarcity.

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