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FOOD SECURITY, WATER SCARCITY AND HUMAN (IN)SECURITY: THE ROLE OF UNU-EHS

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SUMMARY – Water scarcity in the Middle East has been an issue for a long time. Given the current trends of unsustainable water withdrawals, population increase, degradation of land resources, and projected effects of climate change on precipitation in the region, water scarcity will remain a major problem, particularly if the *status quo* is maintained. Achieving food security at the national and household levels will be difficult if policy reforms and technological advances do not take place urgently. Food security affects the human security of the most vulnerable people in the region, typically those living in rural areas and who are directly dependent on local agricultural production. The United Nations University Institute for Environment and Human Security (UNU-EHS) has as main objective to explore threats to human security from environmental degradation, unsustainable land use, and from natural and man-made hazards. UNU-EHS's main goals are to conduct new, policy-relevant research and to contribute to capacity building in various sectors and regions. This work is carried out through networks composed of individuals, organizations and institutions worldwide. UNU-EHS will launch a research programme on droughts and their effects on rural communities and will therefore actively seek interested partners from the Middle East region.

Keywords: environment, human security, food security, water, Middle East

1. INTRODUCTION

The geographical descriptor "Middle East" includes different countries depending on the person or institution defining its conceptual borders. This is particularly evident when trying to find statistical data for the region, as different organizations divide the world into different groups of countries when they present their regional statistics. The definition used here includes the following countries: Afghanistan, Algeria, Egypt, the Islamic Republic of Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Saudi Arabia, Syrian Arab Republic, Tunisia, Turkey, the United Arab Emirates and Yemen. Some of these countries are of course grouped differently from a political point of view. Some statistics and references used in this paper may only characterize subsets of the list of countries above. Given this long list of countries, it is evident that the Middle East is a diversified region whether we consider climate, land resources, culture or economic development. Water, food security and human security issues will therefore vary greatly from one country to another and in some large countries, from one region to the next.

The objective of this paper is not to review detailed statistical data for individual countries in the region, but rather to give a general description of the water and environmental characteristics of the region as a whole and to see how these are affected or can affect current and future food security. Food security is then discussed within the wider concept of human security. Finally, current and future activities of the newly opened United Nations University Institute for Environment and Human Security (UNU-EHS) are discussed within the context of water scarcity and its impact on human security.

2. WATER, LAND, AND FOOD PRODUCTION

A majority of the land area in the region is classified as hyper-arid (aridity index < 0.05) or as dryland, the latter comprising land within arid, semi-arid and sub-humid zones (0.05 < aridity index 0.65 – see UNCCD (2004)). As the aridity index is defined as the ratio of mean annual precipitation to annual potential evapotranspiration, it is evident that most countries in the region potentially face

problems of water supply. Data compiled by WRI (2003) show that for seven of 18 countries in the region, the proportion of land classified as dryland exceeds 90% of the total land area. Other countries or areas such as the United Arab Emirates are classified as hyper-arid. An additional complicating factor is the spatial and temporal distribution of rainfall, i.e. areas with relatively high annual rainfall may not correspond to areas where water is most needed, and timing of the rainfall may not correspond to the time when demand for water peaks. Finally, model predictions indicate that with climate change, annual runoff depths will decrease with time for the entire region (IPCC, 2001).

Within this context, it is not surprising that annual per capita natural renewable water resources for the region varies greatly, from 10 to 3,300 m^3/person (WRI, 2003). Twelve of the 18 countries in the region have < 1,000 m^3/person/year and can therefore be classified as "water-scarce" countries. In some countries, annual water withdrawals as a percentage of renewable water resources is > 100%, indicating that non-renewable water resources are being used, such as mining of fossil water in the Arabian Peninsula (FAO, 2004). Water demand throughout the region is in constant increase due to a rapid increase in population and an increase in per capita consumption. This creates even more pressure on renewable and non-renewable water resources and has forced some countries to look for alternative source of water such as desalinisation of seawater or of brackish water and recycling of wastewater. For example, between 1972 and 1990, water supply in Israel increased by 590 $Mm^3\ y^{-1}$, with 92% of the increase being due to recycled wastewater, saline water, and desalinated water (Lonergan and Brooks, 1995). Given the general scarcity of water in the region, many tensions and conflicts between riparian states have taken place since the 1900s, particularly with the Nile, Jordan and Tigris-Euphrates basins (Wolf, 1996).

The largest sector for water usage is agriculture, accounting for more than 80% of all water use. The reasons why so much water is diverted to this sector of activity is both climatic and political. First, because the ratio of precipitation to evapotranspiration is low, the evaporative demand is satisfied with external sources of water (irrigation). Second, many countries in the region encourage agricultural production in order to get as close as possible to food self-sufficiency, to secure employment for many of their citizens, or to conserve foreign currency reserves (Mubarak, 1998). Unfortunately, poor management and inefficient use of irrigation water have resulted in salinisation, alkalization, water logging and nutrient depletion in large areas in the region. In the Mashriq region, chemical degradation accounts for 36.3% of land degradation, while wind erosion is particularly important in the Arabian Peninsula (UNEP, 2002). Salinisation is particularly important in irrigated areas where the water table is artificially raised while in coastal areas, where excessive groundwater removal is taking place, sea water intrusion degrades the quality of the groundwater. Despite this somewhat critical description of irrigation in the region, it is important to note that in some countries, irrigation methods are highly efficient and have allowed to increase the size of irrigated areas and to increase production without increasing drastically water usage (Wolf, 1996). However, these improved irrigation methods are only used in limited areas across the region and the technology used, such as drip irrigation, can prove too costly for the majority of farmers. Finally, it is estimated that in the Mashriq region and in the Arabian Peninsula, 90% of rangelands are degraded or vulnerable to desertification (UNEP, 2002).

Despite the investment in irrigation and the expansion of irrigated areas, the increase in food production has not matched population growth (UNEP, 2002). For the period 1999-2001, average annual production of cereals decreased in 10 of 18 of the countries in the region when compared to the period 1989-91 while average cereal crop yields decreased in eight countries. The net trade in cereals (imports – exports) expressed as a percent of consumption for the year 2000 ranged from 1% to 100% with most countries being above 50%. Declines in average meat production for the period 1989-91 were observed in five of the 18 countries when compared to the years 1999-2001 (WRI, 2003). The region therefore remains a large net importer of agricultural products, importing three times the value of its exports. In 1999 it imported about one-fifth of world imports of cereals, making the region vulnerable to any sharp rise in the international prices in this commodity (FAO, 2001). Daily per capita calorie supplies for the region in 1999 ranged from 1,760 kcal to 3,540 kcal and, although there is a stagnation in the proportion of undernourished in North Africa, there is an increase in the proportion of undernourished in the rest of the region when the years 1990-92 and 1998-2000 are compared (FAO, 2002).

3. FOOD AND HUMAN SECURITY

Despite the large proportion of irrigated land and the governments' investments and protectionism prevalent in the region, food production is not sufficient to cover food requirements and countries need to import large quantities of food products. Food security can be considered at different scales. At the national level, food supplies can be secured by a combination of local food production and food imports. At the household level, food can be secured by purchase, production, or a combination of both. At both scales, there are risks associated with the potential to achieve food security. For example, at the national level and for oil producing countries, the capacity to import commodities to bridge the gap between local production and local demand may depend on oil prices. When these are high as is the case at the moment, oil exports generate high revenues and the capacity to purchase commodities is increased. When they are low, the reverse is true. Similar principles apply at the scale of the household. Households with high income can purchase food and be somehow resilient when prices go up, but households with low income or whose income directly depends on agricultural production are much more vulnerable to fluctuations in prices or in production.

Some of the poorest people in the region are located in rural areas (e.g. Hazell *et al.*, 2001; Mubarak, 1998). Many of the households in these areas depend on agricultural production for their survival and are therefore exposed to the vagaries of the climate and to the degradation of their resource base. This contributes to the fact that a majority of the people exposed to food insecurity in the region live in the rural areas of the region's low- and middle-income countries (Lofgren and Richards, 2003). Food insecurity is directly linked to the concept of human security, which can be defined as the "freedom from fear and freedom from want" and therefore includes such chronic threats as hunger (UNDP, 1994).

The concept of human security is part of two major paradigm shifts that have recently taken place when dealing with the livelihoods of individuals in general and with the consequences of environmental degradation on livelihoods. The first one is associated with the shift of emphasis from national security to human security. Of course both concepts are interlinked, but since the end of the cold war, new emerging challenges are being addressed by the international community such as increased poverty and disparity, demographic changes, migrations, and rapid urbanization, environmental degradation and climate change, and resource scarcity. UNDP (1994) considered that there were seven main dimensions to human security: economic security; food security; health security; environmental security; personal security; community security; and political security. All these security issues cannot be taken in isolation from one another but from what has been established in the previous sections, there is strong evidence that food, economic and environmental securities are at risk in the region. One key question arising is: how can we determine the extent of environmentally-induced human insecurity and how can we intervene scientifically and politically to reduce it?

The second paradigm shift deals with how we look, interpret, and attempt to mitigate disasters such as floods or droughts and their consequences (such a famine in case of drought). Previously, the approach was to focus on natural hazards and their quantification and determining how they could affect communities. The second paradigm shift involves the assessment and ranking of the vulnerabilities of affected groups as a starting point, in order to define priorities and measures of remedial interventions. Another key question then becomes: how do we assess vulnerability and how do we use the information to reduce it? UNU-EHS was created to deal with both questions by directly linking the environment to human security.

4. THE ROLE OF UNU-EHS

4.1. Organisation of UNU-EHS

As an integral part of the United Nations University (UNU), UNU-EHS contributes, within its mandated scope and field of activities, to the achievement of the mission objectives of the United Nations. UNU is an international community of scholars whose objective is to generate and transfer knowledge and to strengthen capacities relevant to promoting human security and development, in particular in developing countries. The mission of UNU is: "*To contribute, through research and*

capacity development, to efforts to resolve the pressing global problems that are the concern of the United Nations, its Peoples and Member States".

UNU's main thematic areas of research are peace and governance and environment and sustainable development. UNU-EHS is the latest institute created within UNU's network of Research and Training Centres and Programmes. Its operations started in December 2003 and the institute was officially inaugurated in June 2004 with most scientific staffs joining in September of 2004. An organizational chart of UNU-EHS is provided in Figure 1.

4.2. Main research focus

The creation of UNU-EHS is a response to the worldwide concern that the frequency and magnitude of extreme environmental events such as floods and droughts have grown considerably in recent decades. The level of risk these events pose in different locations, the vulnerability of societies to them, and the response capabilities have generally worsened with time. All these changes have contributed to the deterioration of human security. The mandate of UNU-EHS is therefore to explore threats to human security from environmental degradation, unsustainable land use, and from natural and man-made hazards. One of its principal tasks is to improve the knowledge base of the assessment of vulnerability and coping capacity of societies facing natural and man-made hazards, in a changing and often deteriorating environment.

UNU-EHS will tackle, among other issues, the two questions raised in the previous section. Environmentally-induced human insecurity will be studied by determining the vulnerability and coping capacities of communities facing natural and man-made hazards. This will be achieved by conducting original, policy-relevant research and by increasing the capacity of individuals and institutions around the world to deal with such issues. UNU-EHS will develop vulnerability indicators to be able to determine vulnerability levels and ranking of communities facing such hazards. It is important to note here that there are many dimensions of vulnerability: infrastructure vulnerability, economic vulnerability, environmental vulnerability and social vulnerability. The latter type of vulnerability refers to a condition when an event could be so devastating that the social and cultural functioning of a community can been severely affected. Currently, some indicators provide estimates of vulnerability once an event has taken place, i.e. on historical losses. Other methods are based on more general proxy indicators such as Gross Domestic Product that are not specific to any hazard in particular. The objective of UNU-EHS is to develop hazard-specific indicators at appropriate spatial and temporal scales that could be used to assess vulnerability directly. A further stage of this specific research area will be to evaluate the indicators with case studies around the world.

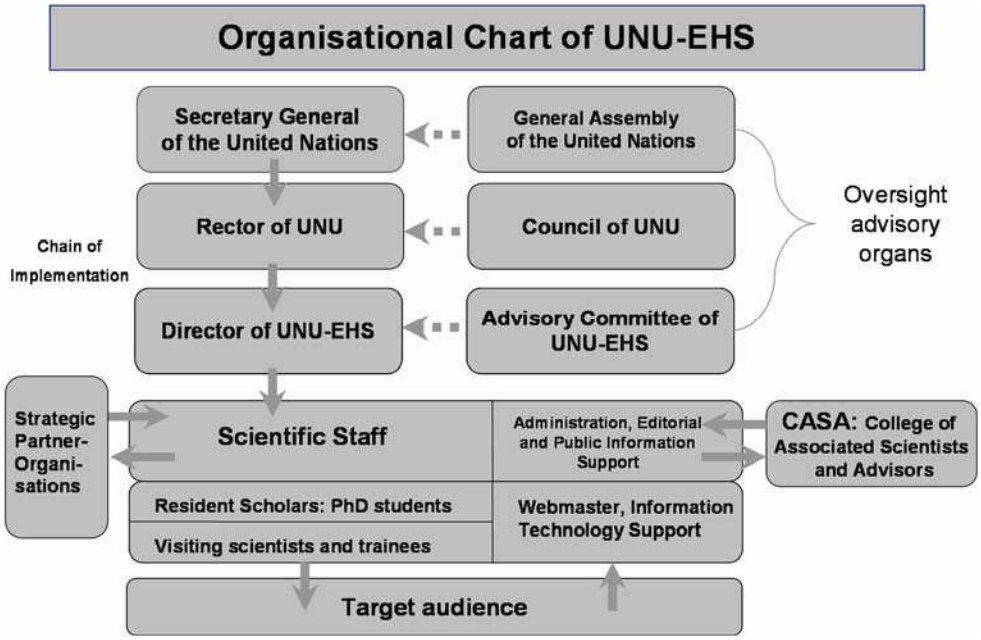

Figure 1. Organisational chart of UNU-EHS.

In addition to its work on vulnerability indicators, UNU-EHS is engaged in other research areas, such as determining how creeping processes (land degradation, climate change, etc.) will modify the spatial and temporal characteristics of the hazards (therefore improving knowledge within the "old paradigm") and explore links between different hazard events and creeping processes and their impact on the inherent risk and vulnerability of communities (reflecting on the "new paradigm").

4.3. Collaboration and capacity building

UNU-EHS carries out its research programmes through research networks. Collaboration is thus systematically sought with organizations and individuals from other UNU institutes, other UN agencies, universities and other research centres around the world, and governmental and non-governmental organizations worldwide. This network approach allows UNU-EHS to benefit from the expertise of individuals across the globe but also to carry out its capacity building activities.

Capacity building is one of the core activities of UNU-EHS. Developed countries generally have strong response capacities to deal with disasters and the inherent relief actions. However, this is not observed worldwide and in some countries, there is a lack of institutional frameworks to address the environmental aspects of human security in a holistic context. There is a lack of knowledge (individual and institutional) and governance to incorporate human security principles into national, regional and community level development plans and into day-to-day management.

Only recently have universities and regional training centres started to offer programmes in integrated disaster and risk management. While this is a first, crucial step, there are still urgent needs to establish the academic profile of an interdisciplinary expert in the environmental dimension of human security. UNU-EHS therefore aims to:

- Create and enhance research capacity (interdisciplinary research groups and Ph.D. study programmes);
- Educate the next generation of researchers in an interdisciplinary, policy relevant context, focusing on case studies and practical applications;
- Develop study programmes at the tertiary level (B.Sc., M. Sc.);
- Train trainers to disseminate knowledge and skills;
- Participate in continuing education and transfer of competencies to practitioners at different levels of governance and responsibility.

In order to achieve some of these goals, UNU-EHS has a formal cooperation agreement with the University of Bonn in Germany and has launched a Ph.D. programme jointly with Centre for Development Research (ZEF) of the University of Bonn. The paramount objective of the programme is to help universities in developing countries to build up human capacity and academic expertise in the areas of competence of UNU-EHS. Additional links with other universities worldwide will be developed in the future.

4.4. Research in arid environments

In the first biennium of its existence (2004-05), UNU-EHS will focus on flood plains and deltas with an emphasis on urban agglomerations. Although there are urban areas in the Middle East that are affected by flooding, droughts affect larger areas recurrently and therefore pose a more serious threat to human security. This is why from 2006 onwards, UNU-EHS will start focusing on droughts and their impact on rural communities. Research programmes are currently being planned following the same lines described above, i.e. developing and evaluating vulnerability indicators but also investigating the effects of environmental degradation on the hazards themselves and on the vulnerabilities of communities. The programme will be developed and implemented worldwide, but given the extreme environmental circumstances in the Middle East and its large rural population, case studies and other research programmes will specifically target the region. UNU-EHS will therefore seek to develop research programmes with partners in the region and to establish strong links with academic institutions.

5. CONCLUSIONS

Water scarcity in the Middle East has been an issue for a long time and is likely to remain an issue in the future. When combined with demographic factors and land degradation, the capacity of some low- and middle-income countries to achieve food security will be reduced as time goes on. Within each country, some communities and households will also find it more and more difficult to achieve food security. Unless needed reforms are implemented and some major scientific advances take place to both limit water use and to boost agricultural production or earning capacity, the vulnerability of many households will increase.

One of the primary research activities of UNU-EHS is to assess the vulnerability of communities facing natural or man-made hazards. Research will focus on developing vulnerability indicators and testing these indicators with case studies in basins worldwide. In parallel with its research activities, UNU-EHS will initiate and participate in capacity building activities through its joint Ph.D. programme and through a variety of activities (workshops, seminars, curriculum development, etc.) and media (publications in scientific journals and UNU-EHS's own series, internet, proceedings, etc.).

Droughts and their impact on rural communities will be a major research arena for UNU-EHS. Research and capacity building activities under this theme will be carried out in collaboration with partners worldwide. UNU-EHS will therefore seek to establish strong working links with individuals, organizations, and institutes in the Middle East.

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