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THE ARAL SEA DESICCATION: SOCIO-ECONOMIC EFFECTS IN CASE OF THE REPUBLIC OF KARAKALPAKSTAN, UZBEKISTAN

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1 ABSTRACT

Previously prominent lake – the Aral Sea being rich in biodiversity maintained the livelihood of people. It ranked fourth place according to its size and it began shrinking in 1960. Its desiccation has triggered various problems which could be distinguished into three groups: environmental, social and economic. Due to timeframe and resource/data limitations not all categories of problems would be covered in this study. Some of the environmental issues will be taken into account, while all of them are interlinked (creating a vicious circle). But in the center of attention is the analysis of the social and economic impact of the Aral Sea desiccation in the region of KP. The literature review showed that most of the research is conducted in the agricultural sector, and the desiccation implications were considered more from the aspect of *causes*, missing out the long term effects of the Aral Sea desiccation. These long term effects are significant in the development of the region from social – health aspect, as health can affect the productivity, unemployment which means no/low income that in turn causes poverty and poverty is one of the main reasons for the environmental degradation to occur. It is a vicious circle of environmental degradation to worsen with health and simultaneously to affect the economic state. This study researched the health effects of the Aral Sea desiccation and with the help of ‘ecosystem approach’ pointed out the long term consequences of the currently existing health issues to the economy of KP.

2 INTRODUCTION

One of the prominent environmental disasters is the desiccation of the Aral Sea. Prior to the 1960s it used to be one of the largest terminal lakes [without outflow] and ranked fourth place in the world (Aladin et al. 2006, p.205). Being rich in biodiversity, the lake provided the people of the Aral Sea region with fishing opportunities in addition to hunting, reed reaping, and livestock breeding which had contributed to people’s livelihood (INTAS 2001; Aladin et al. 2006; Breckle&Wucherer 2011). Its desiccation was due to the irrigation changes that occurred under the reign of the former Soviet Union (FSU), where Uzbekistan was to produce white gold – cotton (Wish-Wilson 2002, p.29; Kapuscinski 1994, p.258). For that two main rivers - the Amudarya and the Syrdarya, which feed the Aral Sea, were diverted from the Aral Sea to open virgin lands (Glantz 2007). Subsequently the lake had undergone various changes like high salinity of water, which caused decline of biodiversity not only in the lake but as well as in the deltas of the Amudarya and the Syrdarya. Since 1980s, the commercial fishing was discontinued owing to high salinity and high costs (Kulmatov & Soliev 2009). Later the salinity reached the level where no fish could survive, except some of the invertebrates (Roll et al. 2003, p.12; Aladin et al. 2008b, p.7; Aladin et al. 2009,

p.180). In 1997 the Aral Sea was declared ‘biologically dead’ by the World Bank (Small & Bunce 2003). At present the Priaralye is known as a disaster zone (Martius et al. 2004). In spite of

large expenditure spent on it there were hardly tangible effects for the people as well as for the lake (Wish-Wilson 2002, p.32; Ataniyazova 2003, p.4). This human induced phenomenon brought imbalance to human life, environment and damaged economy. Karakalpakstan (Uzbekistan) and Kzyl Orda (Kazakhstan) have encountered the most challenges from the desiccation of the lake. However, the construction of the dam in the Northern Aral Sea have positively impacted the Northern Aral Sea and delta of the Syrdarya through a decrease in water salinity and increase in its volume. The number of fish increased and biodiversity is recovering in the Syrdarya delta including the northern Priaralye (Aladin et al. 1995, p.26). This study will shed light on the social impact – health factor. Its long term consequences to the economy were indicated with the help of ‘ecosystem approach.’ As the situation has not improved in Karakalpakstan in comparison to the northern Priaralye, the study focus was set to Karakalpakstan.

3 METHODOLOGY AND DESCRIPTION OF THE RESEARCH AREA

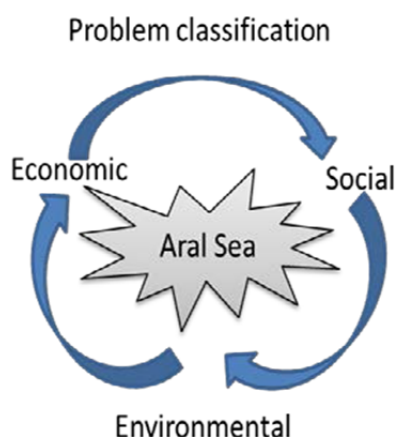
The work is based on a literature survey including different publications, secondary data and national statistics. As it was mentioned earlier, ecosystem approach was applied as well. This method was developed in Canada. “It is goal driven, and is based on a collaboratively developed vision of desired future conditions that integrates ecological, economic and social factors...” in addition to involving the stakeholders in the respective area (Maltby 2000, p.210). Due to focus on KP, the analysis is narrowed to the Republic of Karakalpakstan¹ and does not present Uzbekistan as a whole. Karakalpakstan is located on the northern west of Uzbekistan and tail end of the Amudarya delta (Mamedov 2007). As it is located at the heart of the Aral Sea, changes in the environment (likewise other social and economic effects) were tremendously felt in the region (Ataniyazova 2003, p.1; Micklin 2010, p.203; MSF 2003, p.1).

4 MAIN CONSEQUENCES OF THE ARAL SEA DESICCATION

The overall aftermath of the Aral Sea shrinking could be classified into 3 groups: environmental, social and economic (Figure 1) and they will be summarized in the below provided scheme (Table 1).

Figure 1. Problem classification

¹ The population of Karakalpakstan was estimated to be over 1,6 million people in 2011 (CAWATER). 33% of the population is involved in agriculture, whereas the rest is engaged in other sectors (StatUz 2009). According to Stulina and Poltareva (GWANET 2008, p.3), the share of the unemployed was double with relation to Uzbekistan.



Source: Own illustration

Table 1. General consequences of the desiccation

Economic	Environmental	Social
Unemployment Loss of human capital Low production due to degraded soil and less fish Environmental degradation leading to economic losses owing to Climate change (drought, decline in precipitation, change in the seasons)	High salinity in water and soil Salt/dust storms Desertification Loss of biodiversity Decreasing soil fertility Water, air, soil contamination	Spread of illnesses/poor health Polluted environment to live around Malnutrition Migration

Source: Own presentation based on literature review

The three: economic, social and environmental aspects are pillars of the sustainable development. These three should be in balance, otherwise, chain of issues arise. All the aspects are interlinked, therewith affecting one another with either positive or negative spillovers.

One of the long term effects of the disaster is poverty. The ADB indicates 50-70% of inhabitants of Karakalpakstan to be poor and from that 20% are severely poor (EJF 2005, p.29). Karakalpakstan has the lowest HDI among other regions in Uzbekistan (INTAS 2001, p.26). The livelihood of people in the region (KP) has been affected through unemployment. In fact, up to 60 thousand people have lost their jobs (income generation) and some companies working in the region have shut down due to worsened (environmental) conditions including freshwater deprivation (Ataniyazova 2003, p.1; Strickman & Porkka 2008, p.111). Unemployment peaks in the region. Moreover, wage was lower (1,3%) for nearly one decade

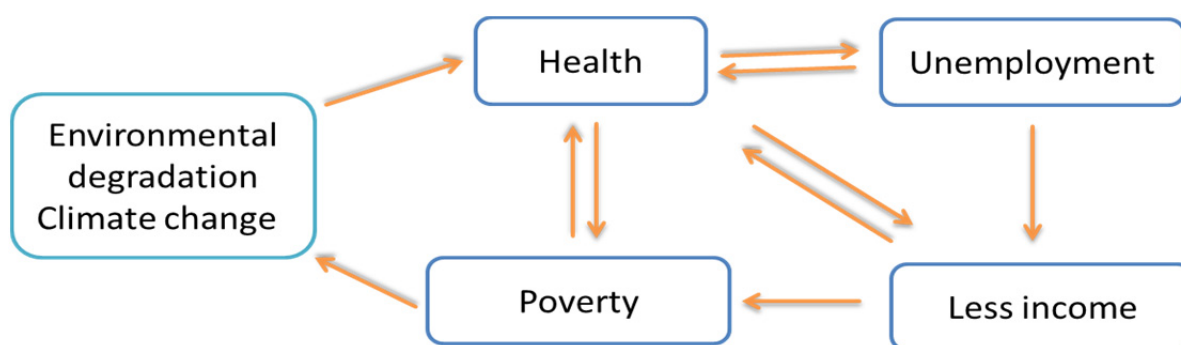
from 1995 till 2004 in comparison to other regions of Uzbekistan and from that point on the amount of money for pension has been reduced.² Low payment (in addition to unemployment and production level) has contributed to low standards of living, because people had no sufficient means for basic consumption goods (MSF 2003, INTAS 2001). The living expenditure has been growing faster than the income, making the living expensive (Myagkov 2006). According to a finding of a household survey by the WB (the World Bank), food expenditure made up the largest share – 93% of monthly income (Small & Bunce 2003). Low payment and unemployment have urged many to leave to other regions of the country or abroad (majority go to Russia or Kazakhstan). In fact, highly qualified specialists have left the region (INTAS 2001, p.27; MSF 2003, p.25). The economic loss of human capital was estimated to equal 4,40 million USD per year or in total 55 million USD (INTAS 2001, p.27). Although there were ups and downs in the economy of the region owing to various factors gradually GDP is growing. However, the increasing GDP does not appear to reach the poor, because the proportion of the poor is highly visible, making up around 70% of the population. This could be confirmed through the reduction in per capita food consumption. Inhabitants of KP were observed to consume less food in contrast to Uzbekistan, mostly vegetables, grain and cucurbitaceae. This later leads to deprivation of protein and vitamin which in turn contributes to low energy and people not being able to maintain working life. Detriment estimations from low standards of living as well as high morbidity in the Southern Priaralye indicated to be over 2 mln. USD per year (GWANET 2007, p.3).

5 ECOSYSTEM APPROACH TO HUMAN HEALTH

As health began deteriorating owing to the above mentioned factors, it has in turn created its own causes and consequences which is little hard to distinguish in terms of causality. It could look like this 1) Environmental degradation → poor health → less employment opportunities → less/no income → less economic growth → poverty → environmental degradation, 2) environmental degradation → unemployment → less growth → poverty → poor health; and 3) Unemployment → poverty → environmental degradation → health issues. This causality was also expressed in Figure 2.

² The pension is lower in comparison to Uzbekistan as a whole.

Figure 2. Implications of the Aral Sea desiccation



Source: own presentation

Determination of the link of the health factor changing with environment could be achieved through several methods. One of them is the ecosystem approach. This method keeps ‘human being as integral part of the environment’ (Forget&Lebel 2001, p.7). One of the main aspects of the ecosystem approach is interdisciplinarity which was not part of the earlier conducted researches (Maltby 2000). The link between environmental health and human health has been missed until today (Baylis 2011; Franz 2007). It could be one of the reasons for the previous research methods to fail to consider the link between ecosystem and health as well as other factors. As it was earlier mentioned, comprehension of the link between environment and human health is a base for sustainable development (Franz 2007). Most of the articles shed light on the causes of the existing issues in the Priaralye. For instance, in 2001 study was conducted by the project CLIMAN (INTAS 2001) concerning socio-economic effects of the desiccation, where the desiccation losses were evaluated in monetary terms. It included all the aspects (social, environmental and economic). For example, the calculation for the sector of economy included loss of fishery, hunting and other environmental sources which have been used to generate income. The project’s evaluation was also more focused at the situation at that time (2001) and no long term effects were considered. Up today the focus has been on water management, which is important, however, the healthcare is another issue that needs to be tackled. Franz (2007) has conducted similar (interdisciplinary) study focusing on the relationship of environment and health. But she concentrated on infant mortality, so this study could help to close the gap in understanding the link between these two factors. However, no claim is made that this is the final and complete study that would explicate the relationship perfectly.

Another study which seemed to be interesting was conducted by Crighton et al. (2003) which was based on a survey conducted in KP to learn about the health effect of the Aral Sea disaster. The finding of a study was that people were less concerned about the environmental effects if there was a source of income (from farming or fishing) or had more relatives. Interestingly, people in Kungrad considered that their health was influenced from the environmental issues. They were not content with the place and would be likely to move in case they could not survive (Crighton et al., 2003, p.561). The scientists found the most severe illness in KP to be caused by the environmental degradation, one of the examples is the salt/dust storms to be main catalyst of worsening breathing illnesses including tuberculosis which is fatal and one of the main reasons for high mortality to exist (studies from Franz 2007, Semenza et al. 1998 and

O'Hara 2000 could be an example). Link between the factors could be initiated by the environmental degradation leading to unemployment or health issues (the causality is hard to distinguish). Although here (in case of the effects of the Aral Sea disaster to Karakalpakstan) it could be assumed that environmental degradation left many unemployed due to loss of fishery and hunting opportunities as it was generating significant amount of income in the livelihood of people. This has also certain effects to the health. But this link (environmental degradation → unemployment/income → health; environmental degradation → health → unemployment/income)³ with its (direct and indirect) consequences has not been investigated in the region (KP), which could be a suggestion for further studies to be carried out (with the help of a survey or certain model). Theoretically, the longitudinal studies indicated the relationship between unemployment and health to be reverse, as unemployment could influence health and poor health causing joblessness (Gordo 2004, p.8). Moreover, there are factors that would affect and relate/connect both aspects which could be learnt from Jahoda's functional model and Warr's vitamin model (see Gordo 2004). Moreover, the link can be continued with further effects of health issues created by unemployment or vice versa. As both of the above mentioned occurs, the individual receives less/no income that diminishes the nutrition which leads to malnutrition (and poverty) causing other side effects (through loss of self-esteem, stress, anxiety, depression) to health (Gordo 2004, p.32). This link is a vicious circle health deteriorating and affecting to other factors which are on the link (Figure 2). The exploitation of natural resources is the only way for the people who have no job and unable to work because of health reasons. In taking any intervention measures the link has to be considered, otherwise it will continue degrading. In the literatures (reviewed for this work), the link between environmental degradation and health was mentioned, but the long term effects of health and other social implications have not been considered yet.

Depending on the health input, the health output could be different. Health input includes availability of potable water, availability of healthcare services, alimantal composition of food and other similar factors which are better provided in the developed countries rather than poor/or developing countries (Weil 2007, p.1265 & p.1268). Some researches scrutinized the long term influence of childhood nourishment and the finding revealed that better diet contributes to enhancement of school completion, IQ, height as well as wage (-health outputs). Other studies have also confirmed the same in addition to health state of the child likewise to play a significant role in the school attendance and later in the wages (Weil 2007, p.1269). The students who were less absent would be more likely to have higher cognitive functioning through receiving better education which can positively affect future employment opportunities. Additionally, when the mortality is enhanced/decreased this could incentivize people to save for retirement, which simultaneously increases investment and <capital (Bloom&Canning 2008, p.1). Capital could lead to increase in capital's marginal product owing to the rise in labour input of healthy workers (Weil 2007, p.1265). Furthermore, better health plays significant role in the external investment and this can be confirmed from the construction project of the Panama Canal where yellow fever made many leave and the project was discontinued (Bloom&Canning 2008, p.8).

³ There might be also exogenous factors like political tensions, war and market distortions/failure which may affect the link. But this part was missed in this study as it is not the main objective of this study.

Health enhancement and longevity of the poor are the main purpose of economic development. It is also one of the methods to decrease poverty. The relationship between poverty and health in the long-run are robust. Illnesses are the outcome and not the cause of the existing issues (Weil 2007, p. 1265). Health is positively associated with income, for instance, high level of income encourages more healthy living through accessing secure potable water and sanitation including the ability to buy improved health care.

Some of the studies conducted led to a conclusion that health could be enhanced with interventions not having the income raised (Bloom&Canning 2008, p.3). Besides, factors like education can also affect health and health reversely can influence education through malnutrition and diseases where children are unable to attend classes or even if attend not able to receive better lesson having concentration problems (owing to lack of vitamin A, which is also causes 'pediatric blindness') and etc. (Bloom&Canning 2008, p.6). Girls are affected by iron insufficiency anemia and iodine insufficiency which becomes worse with menstruation. Poor health hinders the capacity to save and willingness to save. Moreover, it contributes to decrease in the present and collected household saving with the expenses for healthcare as the household might have to sell the household property which in turn contributes to poverty (p.7). Observing the direct impact of health on economic growth is another option to relate to. Here as well the issue of causality arises, but Bloom and Canning (2008, p.13) considers this not to be an issue with taking into account timing. Health seems to impact on economic growth mostly in the developing countries rather than developed ones (2008, p.13). This was statistically confirmed by one of the studies with positive and significant correlation (Bloom et al.2003, p.5) and finding of many studies indicated one year of life expectancy to raise the percentage of outcome by 4 (Bloom et al.2003, p.5; Weil 2007, p. 1271). Certainly, the health enhancement might decrease the per capita income, but the intervention measures to improve health should not be halted. Because with the promotion of family planning, healthcare services and decreased mortality the population growth is slowed down. This could be achieved through policies and giving incentives for people to have few children (Ashraf et al.2008, p.27). The above mentioned was conclusion from many studies which confirmed the effect of poor health on economic development which is also applicable to the case of Karakalpakstan. As Karakalpakstan also encounters the similar issue, where people's health is deteriorating and the further consequences (to economic growth) have not yet been considered. As it was mentioned, the health input determines the output. Hence, for better health output (productivity, workforce) the health inputs (at least healthcare services) have to be improved. At the onset, the health implications (unemployment or less productivity) are felt on the individual level, but in the long term its effects are significant for the economy of the respective region as it contributes to the decrease in income generation (Freeman 2003). Therefore, the side effects of health issues in case ignored could trigger further problems in the long run. This study could be a little reminder that some actions are needed to be taken to prevent further (unexpected and unwanted) implications and it could enable understanding the relationship between various factors (Figure 2) which could help to take the proper measures. Certainly it is hard to solve all the issues at once, as they have taken long time to develop, but at least some mitigation/moderation actions could be taken.

6 SUMMARY

This study has shed light on the socio-economic effects of the Aral Sea desiccation. The economy gradually deteriorated as the lake was a major agent for prosperity of the economy with fishery, resort area, enabling navigation and hunting opportunities at Priaralye. Gradually unemployment with its side effects (malnutrition, low standards of living) has increased. The earlier conducted researches have failed to link various factors and their further effects that could/would occur were missed. Most of the literature neither national nor international has given a thought to the further implications and no moderation actions are taken. The link/relationship and interaction between these three factors (environmental, economic and social-health) is of great significance in taking intervention measures. One of the methods to understand the relationship is 'ecosystem approach.' It is an interdisciplinary approach that has advantages in comparison to classical research methods with its interdisciplinarity and stakeholder involvement in handling the issues in the respective area. This link has been missed in the case of Aral Sea disaster. Hence, this study may help to comprehend this relationship. Moreover, the study was considered from the perspective of health and further implications of health (including hindering aspects for the economic growth and development). The healthy people can contribute to income generation and population growth could gradually decrease, as people have incentive for future perspectives when the health is in good condition. Hence, the link and relationship between these factors (environmental degradation → unemployment/income → health; environmental degradation → health → unemployment/income) has to be taken into account. The projects working in the region failed to address this, hence condition continues to worsen. Up today interaction of these factors have not been studied particularly in the Aral Sea region. Maybe it is one of the reasons for being unable to take the right mitigation actions. Following the guidelines from the ecosystem approach the case of KP could be investigated further, this would be a suggestion for further and precise research.

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