

## ENVIRONMENTAL MIGRATION IN CHINA

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### Abstract

**Environmental degradation and resource depletion play a contributing role in affecting population movement. The work explores the subject of environmental refugees as a significant group of migrants, includes definition of the term and explanation main reasons for fleeing the people from their habitats. The special view is aimed at the analysis of environmental migration in China and the resettlement problems due to construction of development projects, natural disasters and environmental changes or lack of natural resources with security consequences.**

The paper consists of essential environmental characterization of the Yangtze River basin, especially water utilization and environmental changes in the upper reaches of the Yangtze River. The state of environment in the region is very important for sustainable development of the whole China because it provides strategic supplies of water here. This work discusses the theory of solution the environmental problems and establishing sustainable development by the environmental migration in the area. The authors of the work are afraid for that solution of environmental degradation by displacement of people does not deals with causes of the degradation, but looks for reasons for displacement of the people from the development projects area.

The main purpose of this paper is to explain the resettlement issue of the Three Gorges Dam area, especially the resettlement program of Chinese government and the problems connected with its implementation. Final part of the paper deals with the analysis of the actual condition of the environmental refugees from the area and their social and economic situation. The work is partly founded on the field survey in the region and the analysis of selected research works and documents interested in the issue.

**KEY WORDS:** environmental migration, environmental refugees, China, natural resources, the Three Gorges Dam,.

## 1. INTRODUCTION

Global processes creating the vision of the “time-space compression”, as well as shifts in political and economic map of the world underlie current unprecedented qualitative and quantitative changes of the phenomenon known as international migration (Graham, 2000; Zlotnik, 1999). In this way, Zlotnik (1999) accentuates not only growing number of international migrants but also increasing number of countries actively participating in the exchange of people. Demographic trends, increasing number of ethnical, religious, and political conflicts, increasing level of poverty and ever-spreading environmental degradation create large, but far from exhaustive, set of potential migration motives. Thus, research on this topic is becoming more and more important to better understand the complex nature of the phenomenon.

Environmental degradation and resource depletion play a contributing role in affecting population movement, often filtered through contexts of poverty, food deficiency, conflicts and social inequity. In this way, Myers (1993, 1994, 2001b), Brown (2004) and others declare the rapidly increasing number of incidents that force people to leave their houses and fields due to environmental problems. Moreover, the same authors regard environmental migration as an emerging issue of global importance, especially in the light of analysis of climate change conducted by the Intergovernmental Panel on Climate Change (McLeman, Smit, 2004, 5).

Who are environmental refugees? They are people who were forced to leave their traditional habitat, temporarily or permanently, because of lack of natural resources and/or environmental disruption that had jeopardized their existence and seriously affected the quality of their life. Thus, home-region was not able to ensure them safe livelihood. By ‘environmental disruption’ is meant any physical, chemical and/or biological changes in ecosystem (or the resources base) rendering it temporarily or permanently in the way, which is unsuitable to support human life. Environmental disruption, often triggered by population pressures and poverty, can be caused by natural and/or human activity. Not all of the refugees flee their country, many of them being labeled as ‘internally displaced people’ (compare with LiSER, 2004; Myers 1994, 2001b; Leiderman, 2002, 5).

The international refugee legislation, the Treaty of Geneva approved in 1951 (further Treaty), defines refugees “as persons forced to flee across an international border because of a well-founded fear of persecution based on race, religion, nationality, political opinion or membership of particular social group” (UNHCR, 2005; UNHCR, 2002). Institutionally, the issue of refugees falls under responsibility of United Nations Commissioner for Refugees (UNHCR). Both, Treaty and UNHCR, were established more than fifty years ago as a reaction to the huge number of displacement people after World War II. Nowadays, many critics argue that conditions have changed during the last few decades and revision of the concept should be considered. The revision ought to clarify current legal vacuum of two important groups of migrants, in particular “internally displaced people” and “environmental refugees”, which international law does not recognize as refugees and thus these groups of migrants can not draw any material or juridical sup-

port of institutions like the UNHCR or government agencies (compare with Black, 2001; LiSER, 2004; UNHCR, 2002).

## **2. RESEARCH METHODOLOGY AND GOALS**

The domain of research is the phenomenon of environmental migration and environmental refugees as an emerging research topic of global importance. The main goals of the paper are to explain situation of environmental refugees in the selected region and create environment for solution of their situation. Very important question is how to avoid these kinds of projects producing big hazards, possibly how to precede them. The territory of interest is People's Republic of China (including occupied territories) with Special attention given to Upper Reaches of the Yangtze River, especially Three Gorges Dam area.

To address the complexity of the research topic the following issues has to be considered:

- A. The environmental factors including natural conditions and ecological factors of the regions, the frequency of natural hazards in the region, the recent and possible changes of climate in the future, possible changes of environment, environment pollution and human influences.
- B. The social, economic and political factors including international law in the framework of international migration, environmental migration processes in the region, human conditions for living and principal human rights, economic and social development of the regions, population pressure and poverty.
- C. The relations between environment and security including food and water security, conflicts due to natural resources and the possible threats to future in the context of China's increasing consumption of natural sources.
- D. The migration potential in China, especially for last three decades.
- E. The possibilities of predicting the phenomenon of environmental migration in the region.

The range of the paper does not allow authors to cover all the issues, mentioned above. Some of them we can only remark.

Methodologically, the paper is based on analysis of relevant information sources including research studies and documents, scholar journals and information from specialized websites. The information synthesized from the information sources are supplemented with findings of field research conducted in the interest region in October 2004 by one of the authors. The research was carried out in the study area of counties Fengdu, Wushan, Zigui and surroundings of Shibao Tower and was oriented on the social and economic situation of the refugees in the context of environmental issues. The field research tried to verify the conclusions formulated on the basis of information source analysis, using methods of observation and interviews with some displaced people. The document pictures from the areas were taken as well.

### 3. THE TYPOLOGY OF ENVIRONMENTAL REASONS OF DISPLACEMENT IN CHINA

There are three, most frequent cited, reasons why the people have to force their habitats because of environmental degradation or lack of natural resources in China, in particular construction of development project, natural disasters and environmental changes, and lack of natural resources.

#### 3.1. Development projects

Involuntary resettlement in China firstly results from construction of water reservoirs, transport infrastructure, and urban construction (Cernea, McDowell, 2000, 129–130):

- *Reservoir development* was the leading cause of resettlement in past, now displaces no more than 10 percent of the people resettled each year. Reservoir resettlement impacts are much greater and more difficult to deal with than any other type of projects. Entire villages, even townships, are overtaken by reservoirs. These populations must frequently be placed on land already used by others, often in a new political jurisdiction. This can result in host-resettler tensions, and all incomes may decline. Rich fertile land is lost and replacement options depend on fragile soil and less dependable water supplies. New cropping patterns have to be mastered, and land scarcity may force people to look for non-agricultural employment (see below).
- *Transport infrastructure investments* displace primarily rural people located in transport corridors and at the sites of airports, bridge abutment, and so forth. This displacement is therefore limited in scale and may vary from as few as a handful of families to hundreds or thousands, depending on circumstances. Transportation displacements also take place in the urban areas. In the 1980s about 12 percent of overall involuntary resettlement was caused by the construction or upgrading of railroads and roads. In these cases, villages rarely lose all the village land and are able to redistribute the remaining lands to ensure more equity of land use. In more extreme cases they may be given an urban passport and resettled in the nearest town.
- *Urban resettlement* now accounts for the majority of all Chinese resettlement. All urban land is owned by the state and therefore only usufruct rights rather than ownership rights are lost. Any resettlement project must compensate individuals for lost use rights by providing substitute housing of equal or higher standards, and by providing alternative places for doing business and the means to replace lost assets.

The World Commission on Dams published in 2000 report (WCD, 2000), in which impacts of construction of the large dams in the second part of 20th century were evaluated. The displacement is reported from 68 of the 123 big dams (56 per cent), especially in Asia, Africa and Latin America, where large river dams are one of the forms of forced displacement. 40–80 million people have left their livelihoods and homes including 10,2 million people from China between 1950 and 1990 according to official statistics. “But independent sources estimate that the actual number of dam-displaced people in

China is much higher than the official figure” (WCD, 2000, 102-104; compare with Cernea, McDowell, 2000, 128). It was estimated that only the Three Gorges Dam project displaced or will force to display nearly 2 million persons probably, according to independent sources. Official government statistics still quote 1.2 million people. During the second part of the 20<sup>th</sup> century China constructed more than 84,800 reservoirs together with a total capacity of 485.3 billion cubic meters (Wang, Ren, Ouyang, 2000, 63).

The World Commission on Dams declared, that generally “resettlement programmes have predominantly focused on the process of physical relocation rather than the economic and social development of the displaced and other negatively affected people. The result has been the impoverishment of a majority of resettlers” (WCD, 2000, 103). The forced resettlements due to construction of the Three Gorges Dam are in the similar situation (see below in detail).

### **3.2. Natural disasters and environmental changes**

Every year natural disasters, such as floods, drought, storms, hails, earthquakes, landslides and mud-rock flows destroy millions houses and hectares of crops in China and millions people have to be relocated. For example in the period between January 1 and July 20 in 2004 natural hazards „have damaged about 18 million hectares of crops. About 1.6 million hectares of arable land yielded no harvest. An estimated 388,000 houses collapsed and 2.4 million were destroyed, forcing the relocation of nearly 1.3 million people“, killing 659 people and causing losses of about 39.26 billion yuan (4.75 billion USD). Floods accounted for more than half of the deaths and affected 45.7 million people in the same period. „The hardest hit provinces and regions were Yunnan, Guizhou, Sichuan and Chongqing in the southwest, Hubei, Hunan and Henan in central China and Guangxi in the south“ (Lim, 2004). During the first half of the year 2005 floods in southern and eastern China, have killed 567 people, left 165 missing, forced the emergency relocation of 2.46 million people and caused direct economic losses of 22.9 billion yuan (2.77 billion USD) (Reuters, 2005).

The Gobi Desert in China is growing by 10,400 square kilometers a year and the refugee stream is swelling. Asian Development Bank preliminary assessment of desertification in Gansu province identified 4,000 villages, which faced abandonment (Brown, 2004). Desert expansion has accelerated with each successive decade since 1950. China’s Environmental Protection Agency reports that the Gobi Desert expanded by 52,400 square kilometers from 1994 to 1999. The Chinese population of 1.3 billion and a livestock population of just over 400 million have huge impact on the land. “Huge flocks of sheep and goats in the northwest are stripping the land of its protective vegetation, creating a dust bowl on a scale not seen before. Northwestern China is on the verge of a massive ecological meltdown” (Brown, 2003).

The area of the land, affected by drought, was estimated at 195.92 million hectares (approximately 2 million square kilometers) in the period 1949-1990 and the area of the land, degraded by drought, at 7,689 million hectares by year (approximately 77,000 square

kilometers). The average loss of cereal production was 11.0 million tons. But in 1988 the cereal loss was 31,2 million tons and 28,4 million tons in 1989 (Wang, Ren, Ouyang, 2000, 34). "Major natural factors that cause droughts in China are a huge population and very low water resource occupation rate, very uneven and imbalanced distribution of water and land resources, and a great variation of precipitation and runoff within and from year to year." (Wang, Ren, Ouyang, 2000, 33)

Myers estimates that "due to largely to sea-level rise and flooding of coastal-zone communities, but also as a result of increased droughts and disruptions of rainfall regimes such as monsoonal systems, global warming could put large numbers of people at risk of displacement by the middle of next century if not before." (Myers, 1997, 171) Preliminary estimates indicate that the total amount of people at risk of sea-level rise in China is 73 million. (Myers, 1997, 171; Myers, 2001b, 611; compare with Myers, 2001a)

### **3.3. Lack of natural resources**

China feeds 21 per cent of the world's population (in 1997) with 7 per cent of the world's cultivated lands. Simultaneously, China makes an important contribution to the world food supply (Wang, Ren, Ouyang, 2000, 63) and world's prices of foodstuffs. In February 2005 Lester Brown, director of the Earth Policy Institute, published comparative report on two biggest consumers of natural resources - United States and China. "Among the five basic food, energy, and industrial commodities-grain and meat, oil and coal, and steel-consumption in China has already eclipsed that of the United States in all but oil. China has opened a wide lead with grain: 382 million tons to 278 million tons for the United States last year. Among the big three grains, the world's most populous country leads in the consumption of both wheat and rice, and trails the United States only in corn use" (Brown, 2005). The production consumes huge amount of water.

"China's urban population is expected to almost double to a total of more than 600 million. This will engender greatly increased demand for water for household use, to the detriment of the country's agriculture which currently takes 87 percent of all water consumed in order to maintain food production" (Myers, 1997, 171). The worsening of sustainable access to safe drinking water in Chinese cities can trigger human migration in future. While coverage increased in rural areas, access to improved sources decreased in urban areas. This contrasting trend in the region reflects what happened in China over the decade (1990-2002), with coverage in urban areas decreasing from 100 to 92 percent. In rural areas, coverage improved in the same period from 60 to 68 per cent. But in the country there are still almost 300 million people without the access to safe drinking water (UNSD 2004). Migration from rural areas plays an important role in this regard, however, increasing water consumption for industry production concentrated in Beijing and around urban areas on coast is the most crucial factor in this way.

While China consumed around 562.3 billion cubic meters of water in 1997, in 2010 total water supply is expected to increase at 646 billion cubic meters, and for the year 2025 at 720 billion cubic meters. China predominantly depends on surface sources of water

(Wang, Ren, Ouyang, 2000, 63). Considering current lack of water in cities and some parts of China, we can expect some tensions between states sharing the same water resources together with China. As long as China wants to increase the consumption of water from rivers as Brahmaputra or Mekong for irrigation of fields or industrial production, this step will affect the needs of the neighboring countries India, Bangladesh, Laos, Cambodia and Vietnam, which are likely to protest.

Compound water security is becoming a critical issue in China. This issue includes (compare with Wang, Ren, Ouyang, 2000, 169–170):

- food security (food sufficiency and accessibility, malnutrition, famine);
- human (individual) security (adequate safe water access, );
- environmental security (deforestation, soil erosion, desertification, biodiversity conservation, environmental pollution, frequency of disasters);
- social security (state of economy, employment, refugees issue, etc.)

#### 4. CONTEMPORARY AND PROSPECTIVE “HOT SPOTS” OF ENVIRONMENTAL MIGRATION IN CHINA

Upper reaches of the Yangtze River and Yellow River (especially in areas affected by construction of dams and soil degradation), Southeast coast regions (annually hit by tropical hurricanes and floods) and North and Northwest regions in China (threatened by desertification and drought) belong to source areas of contemporary environmental migration. The contemporary aimed areas for people from the environmental devastated regions are coast areas (especially cities), Beijing and other big cities, and Tibet (e.g. for displace people from Three Gorges Dam area). Some of the migrants cross the border to neighboring countries, primarily to Russia, Kazakhstan and other Central Asia states or to USA, Australia, Europe (see Table 1).

Table 1: Contemporary environmental “hot spots”

Contemporary threatened area	Contemporary aimed areas
Upper reaches of the Yangtze River and Yellow River	Sea coast areas (cities), Beijing, Tibet
South-East China (sea coast area, river banks)	Cities near the coast sea; Europe, Australia, USA
North and North-West China (Gobi desert, Turkestan)	Cities, Beijing, Tibet, Central Asia, Russia, Europe

New potentially threatened regions in China with a prospective growth of number of environmental refugees are low situated coast areas in Southeast and East China (primarily because of prospective sea level rise and raised intensity and number of hurricanes due to predicted global or regional climate change), the reaches of the Yangtze River and Yellow River (especially in areas affected by floods, construction of dams and soil degradation),

North and Northwestern China (affected by desertification, drought and lack of sustainable sources of safe water). New potential aimed areas for displaced people in China will be cities in central and western parts of China, the capital Beijing or occupied Tibet. Some of the refugees will cross the border to Central Asia countries, Russia (especially to Siberia), South-East Asia states with a greater Chinese minority (e.g. Indonesia), USA, Australia, Europe (see Table 2).

Table 2: Prospective environmental “hot spots”

<b>Prospective threatened area</b>	<b>Prospective aimed area</b>
Reaches of the Yangtze River and Yellow River	Cities in central and western parts of China, Beijing, Tibet
South-East, East China (low situated sea coast)	Central parts of China, USA, Australia, South-East Asia, Central and Western Europe
North and North-West China	Russia (e.g. Siberia), Central Asia, Beijing, Tibet, Europe

Absolute majority of contemporary and prospective environmental refugees are/will be internal displaced peoples, who do/will not leave China. Considering the present lack of cultivated soil or grassland, sustainable sources of safe water and other natural resources, together with difficult living conditions of the refugees, can undermine social stability in aimed areas and elicit crises or conflicts.

## **5. DISPLACEMENT IN THE THREE GORGES DAM AREA**

### **5.1. Essential environmental characterization of upper reaches of the Yangtze River**

The upper reaches of the Yangtze River covers an area of 1.056 million square kilometers, equivalent of 58.9 percent of the whole Yangtze River basin. It encompasses a region from the sources of the Yangtze to Yichang city (Hubei Province). The landscape consists of mountains (50 per cent), plateaus (30 per cent), hills (18 per cent) and small plains (2 per cent). The population of the region amounts to around 180 million (in 2001), making up 14 per cent of the whole population in China. (Yan, Qian, 2004, 613–614).

Most parts of the upper reaches of the Yangtze River are more than 3000 m above sea level and sloping land forms 45.9 per cent of the total cultivated land (40,700 square kilometers). Soil erosion counts among the most severe environmental problem in the region. The present area, suffering from soil erosion in the upper reaches of the Yangtze, amount between 350,000–393,000 square kilometers, more than one third of the total area upper reaches of the Yangtze. In the 1950s soil area covered 299,500 square kilometers of land (Yan, Qian, 2004, 620–621; Wang, Ren, Ouyang, 2000, 39). The eroded soil in the upper Yangtze reaches 1,568 billion tons, an equivalent of 3,870 square kilometers of soil, depth of 30 centimeters worn away annually. Some authors quoted annually amount of eroded materials 6.8 billion tons (Wang, Ren, Ouyang, 2000, 39). In the limestone areas



in Guizhou province about 1,800 square kilometers of land is being petridesertified and about 76 square kilometers of arable land is lost each year. "Farmers in some villages had to move out of their original locations and resettle to other places due to losses of their farmland" (Yan, Qian, 2004, 621).

Flood periods in some basins in the upper reaches of the Yangtze are four months (Wang, Ren, Ouyang, 2000, 32). Deforestation has increased frequency and size of floods. During the rainy season, floods, mud-rock flows and landslides in deep valleys occur frequently. While serious floods, occurring on the Yangtze in 1998, were mainly caused by abnormal climate and concentrated precipitation, to a great extent they can also be attributed to soil erosion that has reduced the flood discharging and storage capacity of rivers, lakes and reservoirs (Yan, Qian, 2004, 621). In Sichuan, a province located at the upper reaches of the Yangtze River, there are more than 50 counties with forest coverage of only 3–5 per cent (Wang, Ren, Ouyang, 2000, 39).

Environmental destruction causes changes in the climate and land desertification. Climate change in the upper Yangtze River is one of the main factors resulting in the loss of vegetation, degradation of wetlands, etc. Due to regional reduction of rainfall and overgrazing, a vast extent of grassland has been changed to semiarid area. (Yan, Qian, 2004, 622; compare with Wang, Ren, Ouyang, 2000, 43)

Although the region of upper reaches of Yangtze River is very important for sustainable development of the whole China, the environment has deteriorated due to deforestation, reduction of vegetation, soil erosion and pollution of water. These conditions affected the livelihoods of the people in the region. Construction of the Three Gorges Dam worsened environment and forced to displace nearly 2.0 million people from the area. Official authority still contends that number of migrants ranges between 1.1–1.2 million, but it does not only refer to different data between Chinese authority and "independent sources" outside China (see Ming 1999, Adams, Ryder 1998).

## **5.2. Fundamental characteristics of the Three Gorges Dam**

The Three Gorges Dam is located in west China, in Chongqing and Hubei provinces and it is the largest hydropower project in China. Construction of the Three Gorges project started in 1993 and used 13.7 billion USD (113.1 billion yuan) investments by the end of April 2005. The total investment will be controlled with 21.8 billion USD (RMB 180 billion yuan) by 2009, when the whole project is completed despite the hikes of building materials prices in recent years. „Considering the factors of inflation and loan interests, the total investment in the project was initially estimated to reach 26.7 billion USD (RMB 203.9 billion yuan), according to the China Yangtze Three Gorges Project Development Corp (TGP, 2005a). According to some „independent knowledgeable Chinese banker“ the real investments are about 77 billion USD (Adams, Ryder, 1998).

The reservoir is about 600 kilometers long, and the dam is 2,309 meters wide and it is going to be 181 meters high. The area of the reservoir is 1,084 square kilometers (Libra, 2004). Since the year 2003 the level of Yangtze River at the reservoir has risen 135 meters

and will continue to rise close to the level of 175–180 meters. Since the year 2003 about 1,500 towns and villages were flooded due to filling the reservoir.

### **5.3. Resettlement program of Chinese government and its realization**

China's tragic experiences with Danjiangkou and Sanmenxia Dam displacements in the 1960s and 1970s have led to the adoption of new resettlement policy (Cernea, McDowell, 2000, 25). Based on the influence of personal observation in the place, authors of the paper believe that tools, proposed for implementation, are not adequate in the case of Three Gorges Dam area.

According to the official figures, more than 1.2 million people have been resettled because of construction of the Three Gorges Dam. More than 40 percent are rural people, engaged in agricultural production. "The rural resettlement has involved three main methods, in particular settling people in nearby areas, moving them to distant locations in groups, and encouraging migrants to relocate on their own initiative, perhaps by going to live with relatives or friends" (CAS, 2002, compare with Jing, 2000, 26). In fact most rural migrants are still being resettled in the vicinity of the reservoir area (see previous, compare with CAS, 2002). Since June 2005 some 813,000 people in the Chongqing Municipality have been relocated due to the Three Gorges Dam (TGP, 2005b).

Yan and Qian claim that environmental migration in the upper Yangtze is closely related to poverty alleviation and environmental regeneration (Yan, Qian 2004, 615). But the experience of the author of this paper is quite different – the poverty of the displaced people is deeper and the press on environment is much stronger. This analysis is in accord with conclusions of the reports prepared by Wu Ming for International Rivers Network (Ming 1999) and researchers from the Chinese Academy of Science (CAS 2002).

Researchers from the Chinese Academy of Science (CAS, 2002), who asked the migrants and the hosts in the resettlement site of Changling town, in the Wuqiao district of Wanxian city in 2000 confirmed that the migrants had more farmland per capita (0.08 ha) in their place of origin, Tailong town, than in the new location (see Table 3). They could take advantage of the diversity of land resources in Tailong and pursue a variety of livelihoods, such as growing oranges in the orchards and fishing on the Yangtze River, two extremely important sources of income. Even though the amount of cultivated land in Changling town was two times more than in Tailong, due to host population, the migrants were experienced a sudden decline in farmland per capita - 0.04 ha, just half the original amount. They also suffered a great loss of cash income, which had largely been earned by growing oranges, animal husbandry and other farming-related activities in their native town. Though Changling town was less than 20 km away from their place of origin, there were no orange orchards available in the new resettlement site. Some migrant households were further frustrated by the fact that they lost another important part of their livelihood – fishing – because the resettlement site is not situated by the river (CAS, 2000).

Table 3: A comparison of land use in the place of origin and resettlement site  
(in per cent hectares/person)

	<b>Cultivated land</b>	<b>Garden plot</b>	<b>Forest land</b>	<b>Settlement, industrial land</b>	<b>Roads</b>	<b>Water area</b>	<b>Unused land</b>	<b>Land per capita</b>
Original site (Tailong town)	34.97	22.10	4.13	5.49	3.70	6.35	23.26	0.08
Resettlement site (Changling town)	74.90	0	0	7.34	4.41	0	13.35	0.04

Source: CAS (2002)

Compensation rates vary widely across the area, as well as between locations classified as urban and rural, and there has been no indication whether compensation will be adjusted to reflect inflation. The value of the farmers' property, the cost of moving and the price of construction materials to build new houses were calculated in 1992 (Ming, 1999).

Villagers in Gaoyang Township, Yunyang County, have repeatedly appealed to the central government for more resettlement funds. "Their appeal has to do, in part, with the regional discrepancies in the amount of compensation that resettlers can get after part of the resettlement investment is used to build community infrastructures such as roads, irrigation systems, schools, and medical clinics. The following figures are the varying rates of per capita compensation for distribution among individuals" (Jing, 2000, 26-27):

- Fengjie County: 9,458 yuan (1,144 USD)
- Zhongxian County: 7,611 yuan (920 USD)
- Kaixian County: 7,306 yuan (883 USD)
- Wushan County: 7,197 yuan (870 USD)
- Yunyang County: 6,773 yuan (819 USD)

Among the five counties listed above, Yunyang has more cultivated fields to be submerged and a greater number of villagers to be resettled. But it has the smallest amount of compensation funds to be distributed among the local resettlers.

More significantly the migrants experienced a sharp drop in per capita income after displacement. The average per capita income in the 11 households surveyed in Changling town, in the Wuqiao district of Wanxian city decreased from 3,431 yuan RMB (415 USD) in 1999 to 2,450 yuan RMB (296 USD) in 2000, a decline of 29 per cent, with variations according to the work undertaken by the households (CAS, 2002).

Closer analysis of each laborer's working day in different sectors between migrants in Changling town shows an apparent shift from agricultural to non-agricultural sectors. This clearly reflects the fact that there is much less farmland available and more business opportunities in the new resettlement site. The statistics indicate that laborers involved in traditional farming spent 67 percent of their working day on average on these activities before displacement, and that this percentage fell to less than 40 percent after resettle-

ment. This marked change reflects the sharp drop in farmland per capita. As a result, rural migrants have slipped into a state of underemployment after resettlement, leading to a greater surplus of laborers in the resettlement site. Before resettlement, each laborer worked an annual average of 227.4 days, but this figure declined to 165.7 days a year in the new location. Assuming that a laborer employed full-time works 300 days a year, the current employment rate after resettlement is 55 per cent. Before resettlement, the equivalent employment rate was 76 per cent. Resettlement appears to have a disproportionate impact on women. Before resettlement, women laborers worked an annual average of 240.8 days, but after resettlement the figure declined to 157 days. If each woman worked 300 days a year, the current employment rate would be only 52 per cent, compared with 82 per cent before resettlement (CAS, 2002).

#### **5.4. Primary groups of problems and prevent practical aspects of any resettlement programme**

The researchers from Chinese Academy of Science focused on the rural migrants resettled in the peri-urban area around Wanxian city. They identified four groups of problems (CAS 2002):

1. *Development project, natural disasters and environmental changes, and lack of natural resources, serious shortage of farmland.* It is somewhat surprising to note that local farmers suffer more from the resettlement and urbanization than the migrants do. One reason for this appears to be that the state resettlement policy guaranteed migrants a per capita average of 0.04 ha of farmland, while the host population was persuaded, sometimes forcibly, to hand over part of their land to the migrants. As a result, local farmers had an average of 0.02 ha per capita left for themselves, just half the size of the migrants' land-holdings.
2. *Continuous decline in household income.* A substantial decline in income from traditional agriculture can be seen in both migrants and locals. The poverty-stricken reservoir area seems to have suffered more from this trend because of the weak local economic foundations, a limited labor market and growing competition from other regions in developing non-farm industries and products. Apart from households with members working in the construction industry, both migrants and locals engaged in all other production categories are experiencing a steady decline in household income.
3. *Unemployment and underemployment.* The employment rate among migrants was 76 per cent before displacement, but the rate dropped to just 55 per cent after their resettlement. For the host population, the employment rate was 86 per cent in 1997 but only 65 per cent in 2000. It can be anticipated that, inevitably, a large jobless army is likely to harm the local economy and trigger social unrest in the Three Gorges area.
4. *A low level of education and technical skill* among both the migrant and host populations will have a negative impact on future sustainable development in the reservoir area. The migrants had an average of 6.52 years of schooling in 2000, while the host population had an average of 5.95 years. Workers in factories, the construction in-

dustry and in commerce and services had more education than agricultural laborers, who had 5.47 years of schooling (migrants) and 4.36 years (host population). These figures give an indication of why both migrant and local laborers are experiencing a great deal of difficulty in shifting from farm work to non-agricultural sectors.

Authors of this paper suppose that implementation of any resettlement program should cover the following practical aspects (compare with Yan, Qian, 2004, 629–632):

- adequate preparation
  - clear and transparent criteria for relocation,
  - social impact assessment,
  - environmental impact assessment,
  - suitable and fertile fields for farmers,
  - suitable and sustainable employment opportunities for workers,
  - new suitable houses (mainly for villager) or flats (mainly for inhabitants of towns and cities)
  - suitable policies for relocation,
- willingness and participation of migrants
  - long-term explanation campaign,
  - comply to human rights,
  - psychological assistance,
- willingness and participation of hosted population
  - allow preserving standards of livelihood,
  - improve the infrastructure situation in target areas,
- adequate funds for
  - compensation, rehabilitation and social programmes,
  - construction of new villages, towns, cities or houses, flats,
  - construction of new factories or other employment opportunities,
  - modern environmental technologies and equipment (access to safe water, sewerage, etc.)
  - purchase and adaptation of target areas;
  - relocation,
  - usable instruments and capacity for moving (vehicles, buses, etc.),
- social integration
  - allow preserving standards of livelihood,
  - long-term process of integration to new environment, culture, society, etc.

## 6. CONCLUSION

Nowadays, environmental migration is emerging as a new phenomenon with an unpredictable potential. China with its scarce resources, overpopulation and economic development projects represents a country, which can be seriously hit in this regard. The case of Three Gorges Dam region clearly illustrates the relevance of this assertion. Some authors claim that environmental migration from the region is an inevitable and only solution to local environmental and social problems. "Implementation of environmental migration to relieve population pressure and bring about sustainability of development between environment, population, economy, and society in this region has been proposed in recent years" (Yan, Qian, 2004, 615). "Emigration from overloaded water - carrying capacity and ecologically fragile regions is necessary, but needs careful human ecological planning and management" (Wang, Ren, Ouyang, 2000, 171; compare with Jing, 2000, 26). Yan and Qian claim that some areas do not possess the basic condition for human subsistence. "An important cause is the excessive growth of the population and the continually increasing population densities. Increased population pressure then ensues in over-cultivation, over-grazing, and haphazard logging, leading to reduction in vegetation and exacerbated desertification" (Yan, Qian, 2004, 614–615). Through environmental migration, the people will be moved out of areas with seriously degraded environment or unlivable natural environment that essentially do not possess the condition for human subsistence and they will rebuild their resettlements in other locations.

However, it remains the question: "Is environmental migration from the region in accord with the fundamental principles of sustainable development?" According to the authors of this paper the answer is rather straightforward. The solution of environmental degradation using the strategy based on the displacement of people does not solve the primary causes. Instead of searching a more acceptable solution for all actors (e.g. construction of smaller dams, implementation of environment friendly technologies) the problem is transferred elsewhere with blurred impacts on both, original and host areas. In China, the problem is complicated by the absolute lack of natural resources including land. Thus, the construction of the Three Gorges Dam contributed to environmental pressures and social problems of displaced people. Economic benefits are controversial as well.

Research reports from the field and personal experiences of one of the authors of the paper argue that environmental migration generally cannot solve environmental problems or poverty of people in the Three Gorges area or in the whole China. The solution of the issue consists of change of access to environment and nature generally, prevention of wastage of natural resources and prevention of water contamination (compare with Wang, Ren, Ouyang, 2000, 44). Agriculture in the area needs to use modern environmentally friendly technologies together with best knowledge (e.g. measures against the soil erosion mainly), which allows producing sustainable food and social security in the region. The experience from study areas (e.g. county Zigui) gives evidence that local people do not use the basic measures against soil erosion in their fields.

The construction of the Three Gorges Dam can contribute to economic growth in some areas of the region, but it will not surely help to nearly two million displaced people,

who had to leave their habitats, houses and fields. Even though the promises of the central government or local authorities, enhance of living standards have not become, but reversely, the environmental refugees from the area have become poorer. Authors of the paper can confirm that many of them came back to their original sites in spite of strict prohibition, where they try to live and grow farming products to the last moment. They live in temporary homes (that are frequently built from papers, or plastic foils) and "wait" for reservoir level rise. For this reason their future fate remains unsure. We can expect their illegal migration to some Chinese cities with all negative consequences of their decision.

## SHRNUTÍ

### Environmentální migrace v Číně

Studie se zabývá problematikou environmentální migrace v Číně, jejími příčinami vzniku a konkrétními dopady na vystěhované obyvatelstvo, především v oblasti výstavby přehradní nádrže „Tři soutěsky“. Dále jsou zmíněny odhady současné i budoucí environmentální migrace v regionu a provedena diskuse týkající se problematiky teoretického východiska environmentální migrace ve smyslu řešení environmentálních problémů oblasti. Největší prostor je věnován analýze sociálního, ekonomického a environmentálního prostředí environmentálních uprchlíků pocházejících původně z oblasti zmíněné přehradní nádrže.

Práce je založena na analýze a následné kompilaci materiálů zabývajících se environmentální, sociální, ekonomickou a migrační problematikou a pozorování v oblasti výstavby přehradní nádrže „Tři soutěsky“ z října 2004 prováděné jedním z autorů. Během tohoto výzkumu došlo k pořízení mnoha obrazových i písemných záznamů dokumentujících reálnou situaci uprchlíků v okolí přehrady a ověření některých závěrů citovaných výzkumných zpráv.

## REFERENCES

ADAMS, Patricia; RYDER, Gráinne (1998): *China's great leap backward - part 1 of 2*. [online]. Three Gorges Probe - Three Gorges Dam news service. [cit. 2005-05-18] Available from [www.threegorgesprobe.org](http://www.threegorgesprobe.org).

BLACK, Richard (2001): *Environmental refugees: myth or reality?* [online]. New Issues in refugee Research. Working Paper No. 34, March 2001, [cit. 2004-02-18] Available on <http://www.jha.ac/articles/u034.pdf>. ISSN 1020-7473

BROWN, Lester R. (2003): *China losing war with advancing deserts*. [online]. Posted: 15 August 2003, peopleandplanet.net [cit. 2004-02-18] Available on <http://www.peopleandplanet.net/doc.php?section=3&id=2037>.

BROWN, Lester R. (2004): *New flows of environmental refugees*. [online]. Posted: 03 February 2004, peopleandplanet.net [cit. 2004-02-18] Available on <http://www.peopleandplanet.net/doc.php?id=2134>.

BROWN, Lester R. (2005): *China Replacing the United States as World's Leading Consumer*. [online]. February 16, 2005, Earth Policy Institute [cit. 2005-02-18] Available from [www.earth-policy.org](http://www.earth-policy.org).

CERNEA, Michael M.; MCDOWELL, Cristopher (ed.) (2000): *Risks and reconstruction. Experiences of Resettlers and Refugees*. The World Bank. Washington, D.C. ISBN 0-8213-4444-7

CHINESE ACADEMY OF SCIENCE (CAD, 2002): *Three Gorges rural resettlement and its impact on the host population and the environment*. [online]. Three Gorges Probe - Three Gorges Dam news service. March 1, 2002, [cit. 2005-05-18]. Available from [www.three-gorgesprobe.org](http://www.three-gorgesprobe.org).

GRAHAM, David, T. (2000): The people paradox: human movements and human security in a globalising world. In *Migration, Globalisation and Human Security*. London: Routledge, pp.186-216.

JING, Jun (2000): *Displacement, Resettlement, Rehabilitation, Reparation and Development - China Report*. [online]. Prepared for Thematic Review I.3 as an input to the World Commission on Dams, Cape Town. [cit. 2005-06-29]. Available on <http://www.dams.org/kbase/thematic/tr13.htm>.

LEIDERMAN, Stuart M. (2002): *The World Problem of Environmental Emigration from Polluted Regions*. The NATO Advanced Research Workshop. September 5-7, 2002, Mariupol, Ukraine.

LIBRA, Martin (2004): *Největší hydroelektrárna světa je na řece Paraná*. Vesmír, Vol. 83, July 2004, p. 367. (in Czech only)

LIM, Benjamin Kang (2004): *China disaster toll at 659; typhoons loom*. [online]. Planet Ark 23/7/2004, Reuters News Service. [cit. 2004-07-23] Available from [www.planetark.com](http://www.planetark.com).

LiSER Foundation (2004): *Living Space for Environmental Refugees*. [online]. [cit. 2004-02-19] Available from [www.liser.org](http://www.liser.org).

LONERGAN, Steve (1998): *The Role of Environmental Degradation in Population Displacement*. [online]. Global Environmental Change and Security Project Report, Research Report 1, July 1998 (2nd edition), University of Victoria, Canada. [cit. 2004-02-23] Available on <http://www.gechs.org/rr1/appendices.pdf>.

MCLEMAN, Robert; SMIT, Barry (2004): *Climate Change, Migration and Security*. [online]. Commentary No.86, Canadian Security Intelligence Service, March 2, 2004. [cit. 2004-05-25] Available on [http://www.csis-scrs.gc.ca/eng/comment/com86\\_e.html](http://www.csis-scrs.gc.ca/eng/comment/com86_e.html). ISSN 1192-277X.

MING, Wu (1999): *Resettlement Problems of the Three Gorges Dam. A Field Report*. [online]. International Rivers Network. Berkeley. Last modified 18/10/1999 [cit. 2004-09-23]. Available on [www.irn.org/programs/threeg/resettle.htm](http://www.irn.org/programs/threeg/resettle.htm).



MYERS, Norman (1993): *Environmental Refugees in a Globally Warmed World*. BioScience 43 (11) Dec 1993, p. 752–761. ISSN: 0006-3568

MYERS, Norman (1994): *Environmental refugees: a crisis in the making*. People & the Planet, No.4/1994.

MYERS, Norman (1997): *Environmental refugees*. Population and Environment: A journal of Interdisciplinary Studies, Vol. 19, No 2, November 1997, p. 167–182.

MYERS, Norman (2001a): *Exploring The Frontiers of Environmental Science*. [online]. The lecture at occasion of laureate of the Blue Planet Prize by The Asahi Glass Foundation in Tokyo. [cit. 2004-02-23]. Available on <http://www.af-info.or.jp/eng/honor/2001lecture.pdf>.

MYERS, Norman (2001b): *Environmental refugees: a growing phenomenon of the 21<sup>st</sup> century*. Philosophical Transactions: Biological Sciences, Vol. 357 No.1420/2001, p.609-613. ISSN 0962-8436

REUTERS NEWS SERVICE (2005): *Swollen Chinese Rivers Recede, but Rain Forecast*. [online]. Planet Ark 27/6/2005 [cit. 2005-06-28] Available from [www.planetark.com](http://www.planetark.com).

THREE GORGES PROBE (TGP, 2005a): *113,1 billion yuan already invested in Three Gorges project*. [online]. Three Gorges Probe – Three Gorges Dam news service. 8/5/2005 [cit. 2005-05-18] Available from [www.threegorgesprobe.org](http://www.threegorgesprobe.org).

THREE GORGES PROBE (TGP, 2005b): *813,000 residents relocated for dam project*. [online]. Three Gorges Probe – Three Gorges Dam news service. 14/6/2005 [cit. 2005-06-26] Available from [www.threegorgesprobe.org](http://www.threegorgesprobe.org).

UNHCR (2002): *Environmental migrants and refugees*. Refugees No. 127/2002, p. 12-13. ISSN 0252-791X

UNHCR (2005): *Text of the 1951 Convention Relating to the Status of Refugees-Text of the 1967 Protocol Relating to the Status of Refugees - Resolution 2198 (X X I) Adopted by the United Nations General Assembly - With an Introductory Note by the Office of the UNHCR*. [online]. [cit. 2005-06-29] Available on <http://www.unhcr.ch/cgi-bin/txis/vtx/protect?id=3c0762ea4>.

UNITED NATIONS STATISTICS DIVISION (UNSD,2004): *Progress towards to Millennium Development Goals, 1990–2004. Goal 7 - Ensure environmental sustainability*. [online]. [cit. 2005-05-10]. Available from [http://millenniumindicators.un.org/unsd/mi/mi\\_coverfinal.htm](http://millenniumindicators.un.org/unsd/mi/mi_coverfinal.htm).

WANG, Rusong; REN, Hongzun; OUYANG, Zhiyun (ed.) (2000): *China Water Vision. The Eco-sphere of Water, Life, Environment & Development*. China Metereological Press, Beijing. ISBN 7-5029-2977-0/X · 0044

WORLD COMMISSION ON DAMS (WCD, 2000): *Dams and Developmen: A New Framework for Decision-Making*. The Report of the World Commission on Dams. Earthscan, London. ISBN 1-85383-798-9 paperback

YAN, Tan; WANG, Yi Qian (2004): *Environmental Migration and Sustainable Development in the Upper Reaches of the Yangtze River*. *Population and Environment*, Vol. 25, No.6, July 2004, p. 613-635. ISSN/ISBN: 01990039

ZLOTNIK, Hania (1999): Trends of international migration since 1965: What existing data reveal. *International Migration*, 1999, vol. 37, no. 1, pp. 21-61.

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