

Key Issues:

10- Landscape and Cultural Heritage

7-Resettlement

Climatic Zone:

Bs : Semi arid steppe

Subjects:

- Transfer and Preservation of Inundated Cultural Heritage
- Restoration of Livelihood and Rebuilding of Resettled Communities

Effects:

- Recording and Permanent Preservation of Many Cultural Heritages in the Area to be Inundated
- Proper Compensation to Resettling People and Provisions to Secure Their Sustainable Earnings, and Build-up Infrastructures

Project Name: Border Euphrates Project

Country: Turkey

Implementing Party & Period

- Project:

Birecik Dam and HEPP: Birecik A.Ş.
2000 (Completion of construction)

Karkamis Dam and HEPP: State Hydraulic Works (DSİ)
1999 (Completion of construction)

- Good Practice:

Birecik Dam and HEPP: Birecik A.Ş.
1996-2000

Key words:

Cultural Heritage, Resettlement, Inundation, Archaeological study

Abstract:

The Birecik Dam and Karkamis Dam are the two successive dams near to the Syrian Border. They use the water of the Euphrates River which has already regulated at the upstream by other dams. In fact those two dams are operated together. The reservoir of the both dams inundated some historical sites. Because of that before completion of the dams some excavations were carried out. As a result, one third of the ancient city of Zeugma was rescued. Also several valuable historical pieces were unearthed at the site of the Karkamis Dam. Furthermore, a participatory resettlement program was successfully implemented for about 6,500 affected people.

1. Outline of the Project

The Southeastern Anatolia Project (GAP in Turkish acronym) consists of several dams on the Euphrates and the Tigris Rivers. Those two rivers account for 23 % of annual surface water of Turkey. The GAP project consists of 13 project packages related to energy production, irrigation, domestic and industrial water supply. Seven of those packages are developed in the Euphrates Basin. The Border Euphrates Project is one of them. The project consists of two units, the Birecik Dam and Hydropower Plant and the Karkamis Dam and Hydropower Plant, which are located at the downstream of the Ataturk Dam. Figure 1 shows the location of the GAP Region and the dams.



Birecik Dam



Karkamis Dam



Figure 1: The Location of the project

GAP was launched initially as irrigation and infrastructure investment, then gained the character of an integrated multi-sector regional development project in 1989 and was ultimately converted to a sustainable human development project in 1995 thus placing human being at the focal point of development.

The construction of the Birecik Dam on the Euphrates River that provides electricity and water for irrigation was started in 1993. It costs US\$1.3 billion. The Birecik hydropower plant has a capacity of 672 MW to produce 2.5 GWh annually. Area of 92,700 hectares will be irrigated. The maximum water elevation is 385 m and reservoir area is 56.25 km².

Karkamis Dam is the last dam of the Euphrates in Turkey and 4 km from Syrian border line. The construction of the Karkamis Dam, 192 million US dollars cost of project, was completed and financed on turn-key basis by an Austrian Consortium in 1999. Karkamis HEPP consists of six units producing 652 GWh/y with 180 MW installed capacity.

The specifications of Birecik project and Karkamis projects are shown in Table 1.

Table 1: Key features of the Karkamis and the Birecik Dam

Item		Karkamis	Birecik
Location		Sanliurfa	Sanliurfa
River		Euphrates	Euphrates
Purpose		Energy	Irrigation, Energy
Construction year	Starting	1996	1996
	Completion	1999	2001
Implementing Party		State Hydraulic Works (DSİ)	Birecik A.Ş.
Dam	Embankment type	Concrete Gravity/Earth fill	Concrete gravity/Rock fill
	Dam volume	2,100 hm ³	9,400 hm ³
	Height (from river bed)	22.5 m	63 m
	Reservoir volume at normal water surface elevation	157 hm ³	1,220 hm ³
	Reservoir area at normal water surface elevation	28.4 km ²	56.2 km ²
	Irrigation Area	None	92,700 ha
	Design flood discharge	17,411 m ³ /sec	17,353 m ³ /sec
HEPP	Start of Operation	1999	2001
	Capacity	180 MW	672 MW
	Annual Generation	652 GWh	2,518 GWh
	Max Power Discharge	1900 m ³ /sec	1,900 m ³ /sec
	Max Effective Height	10.55 m	42 m

2. Features of the Project Area

The Border Euphrates Project is laid out on the plain near to Syrian Border. Because of that heights of the Birecik Dam and the Karkamis Dam are not very big. However dams will use regulated water by other dams at the upstream. The area is semi-desert, because of that they will be used to supply irrigation water.

It is nearly impossible to measure economical benefit of single dam since each project is the part of the integrated project. The Gap project will serve to the whole region and not only the city of Sanliurfa where those two dams are located. Therefore it is quite accepted to look over the whole region. Table 2 compares several parameters of the GAP Region with Turkey. Figure 2 shows population distribution of the GAP Region. Table 3 gives total energy production and monetary equivalent of the produced energy of three dams of the GAP Project including the Ataturk Dam.

Table 2: Comparison of the parameters between the GAP Region and Turkey

Parameters	GAP Region	Turkey
Total Area (km ²)	75,000	780,000
Population	6.6	67.8
Water Budget (billion m ³)	52.9	186.1
Irrigable Land (hectare)	1.7	8.5
Hydropower Potential (billion kWh)	27.5	122

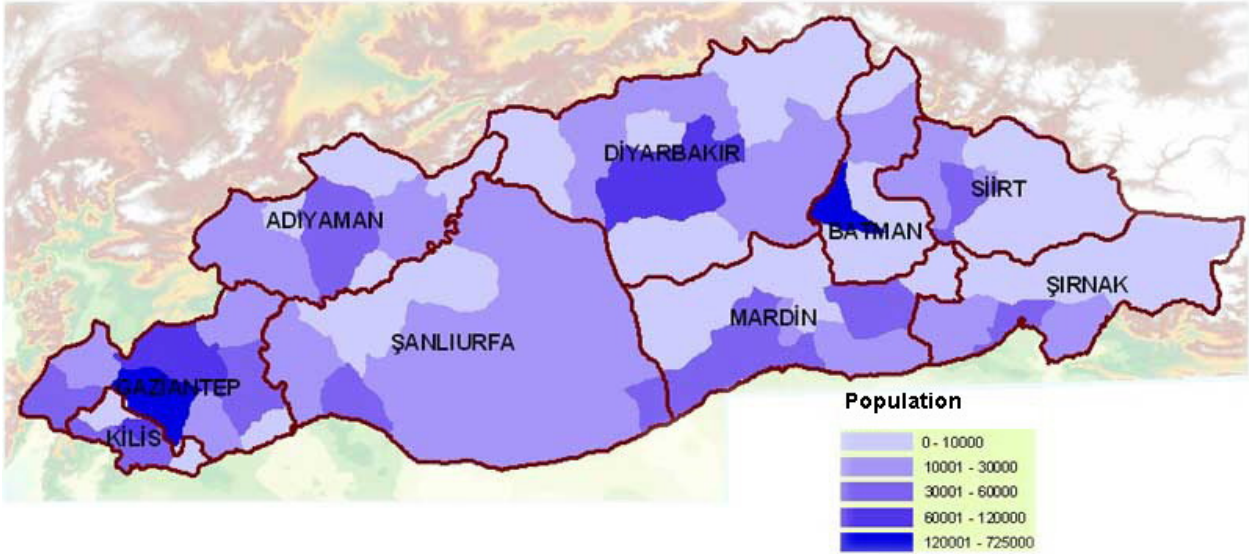


Figure 2: Population distribution in GAP Region (www.gap.gov.tr)

Table 3: Total energy production and monetary equivalent by the year of 2002.

Dam and HPP	Year of Operation	Installed Capacity (MW)	Total Energy Production (billion kWh)	Monetary Equivalent (million \$)*
Ataturk Dam and HPP	1993	2,400	79.5	5,073
Birecik Dam and HPP	2000	672	3.3	301
Karkamis Dam and HPP	1999	189	0.9	71.4

* 1 kWh = 6 US cent

3. Major Impacts

3.1 Cultural Heritage

The trace of Hittites, Assyrians, Meds, Persians, Romans, Arabs and Turks can be seen in Turkey. The area of the Border Euphrates is also rich in terms of historical remains. Whole GAP Region was the home of early civilizations. Therefore, from the beginning of the GAP, the rich cultural heritage of the region was a concern. Especially after Samsat that was flooded by the Ataturk Dam's reservoir, the subject of salvaging cultural heritages gained importance. Hasankeyf, another ancient city on the Tigris River, gained focus of national and international organizations due to the planned the Ilusu

Dam. The salvage work on cultural heritages of Karkamis and Hasankeyf were started in 1998. The Figure 3 shows the place of the cultural heritage in the GAP Region.

About one third of known extent of Zeugma was inundated by the lake of the Birecik Dam. In Figure 4 the area indicated by the red line was flooded by the dam. Zeugma is the collective name for two cities on each side of the Euphrates River – Seleuceia and Apamea. The cities were founded in 300 BC by one of Alexander's generals. It is the one of the four big cities of the Kingdom of Kommagene around 1st century BC. It was annexed by the Roman Empire in 64 BC. The king of the Sasanids, Shapur I destroyed city in 256 BC. But the city remained under the rule of the Late Roman empire until 7th century when Moslem attacks took place. After that the city lost its importance. The village of Belkis which is surviving to our times was founded in the 17th century. Since it is a settlement over the Silk Road and one of the crossing of the Euphrates River, the city witnessed many governance and culture through the history. Therefore it is an important cultural heritage.

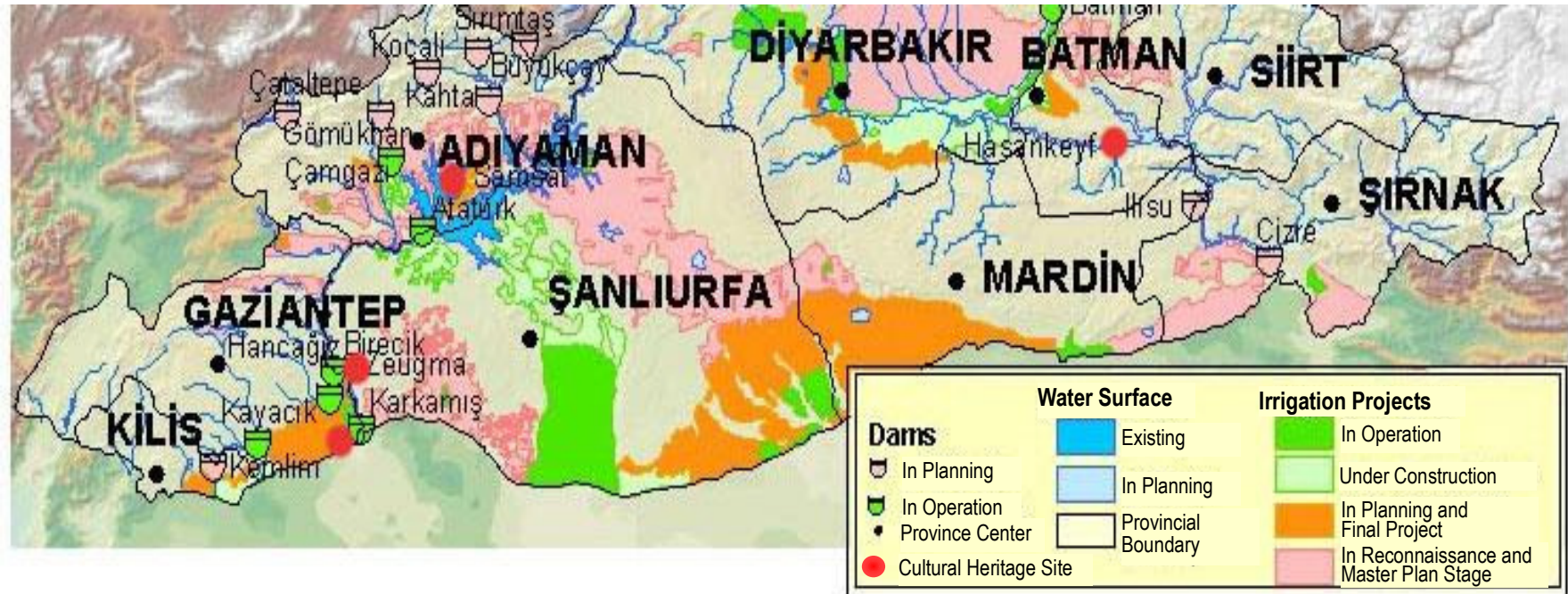


Figure 3: Interrelations between the GAP Project and Cultural Heritage Sites (www.gap.gov.tr)



Figure 4: The site of the Zeugma; the area bordered by a red line flooded by the Birecik Dam (GAP Administration)

3.2 Resettlement

The Southeastern Anatolia Project is a multi-sectoral, integrated regional development project which is one of the biggest development projects in the world in terms of the area it covers, physical magnitudes and targets. It aims to use land and water sources to ensure regional development. The impacts of the projects are also large. There are 100,000 people affected due to inundation of land by reservoirs. Impoundment in the Birecik Dam started in December 1999. There are 9 villages fully inundated while one district center and 4 villages have been partly affected by the reservoir lake. 31 villages have been affected due to loss of agricultural area. At the beginning of the project it is estimated that population of 31,971 as given Table 4 (Yasinok, 2000) would have been affected by the inundated area of the reservoir lake. However it was realized that there are 6,500 people and 850 households (families) would need to be under the resettlement program. The difference of the figure is the result of migration from the region to the big cities due to unemployment problem and security problem aroused late after 1980.

Table 4: Characteristic of Inundated Area by the Birecik Dam (After Yasinok, 2000)

District	Number of Settlement Program	Houses affected	Inundated Area (Hectares)	Number of Resettlers *
Birecik	7	1,185	1,500	6,228
Halfeti	10	677	845	8,181
Bozova	6	84	288	2,778
Nizip	10	2,896	1,779	3,493
Yavuzeli	2	103	104	1,757
Araban	5	42	225	4,609
Besni	1	28	64	2,140
Merkez	2	69	150	2,785
Total	43	5,084	4,955	31,971

**According to 1997 census*

4. Mitigation Measures

4.1 Cultural Heritage

An international effort was undertaken to document, save and exhibit the cultural heritages of Zeugma starting 1996, before the reservoir rises. Several teams of archaeologist and other experts from Turkey, Britain, France, and Italy under the umbrella of Oxford Archaeological Unit supported financially by Packard Humanities Institute's and several agencies of Turkish Government have participated in rescue operation.

The archaeological studies in Zeugma were scheduled according to time of filling of the lake of the dam's reservoir. Before October 2000 excavations were completed. Items, which can be transferred, were carried to the Gaziantep Museum. Figure 8 are some examples of the mosaic taken to the museum. Others were preserved in site for future generation. The Conservation Program was developed by Centro di Conservazione Archeologica (CCA). Frescoes and Mosaics found to be immovable were protected at the original places. They were first cleaned and then covered by lime paste to make them water resistant as much as possible.

Figure 5 is the picture of the excavated area. 120 archaeologists and conservation specialists, with 250 laborers worked at the site 7 days a week (Figure 6). Excavation efforts unearthed buildings, temples, churches, water canals, objects made of stone, ceramic, glass, iron, bronze, 91 frescoes, 700 m² mosaic and 100,000 bulla.

All finds are documented in an electronic environment. The documentation work consists of three components, written documents, drawing and digital camera conventional photography (Figure 7).



Figure 5: Excavation Area of Zeugma



Figure 6: Experts on the site



Figure 7: Recording by digital techniques



Figure8: Examples from Mosaic rescued from the site of Zeugma

4.2 Resettlement

Since the projects backs to 1960's, the monitoring of the previous resettlement is possible. According to Turkish Legislative rules affected people can choose either governmental or self resettlement. In the past 75 % of people chose self resettlement all projects developed in the country. However monitoring results show that 67 % of those who have settled earlier by the State and 89 % of those who have had their compensation want to back to their original places. This indicates that those who preferred self settlement face greater problems. Because of that the GAP-RDA launched the project "Resettlement, Employment and Economic Investments of People Affected by Birecik Dam" to help the affected population to resettle and to facilitate their adaptation to their new environments in social, economic and cultural terms. The project was given start in August 1997 and finished at the end of 2000. The people concerned and other relevant parties were kept informed through an information and consulting office functioning in Halfeti about the process at all stages of the project and their participation to decision-making was sought. The participation mechanism can be described as:

- High counsel for coordination among related organizations
- Steering committee at regional level for monitoring and decision making
- Social studies on affected settlements
- Community meetings for local participation
- Workshop on sites
- Information centre and multi-purpose community center

The project implementations supported affected people in social and economic terms and ensure their resettlement in line with the principles of sustainability and participation planning. Activities were carried out on three separate but closely interlinked components:

- Social component: It is related to social and recreational activities to help people adapt to their new life and environment. Multipurpose Community Centers were established.
- Economic component: It is related mainly to funds paid out as compensation and the aim is to channel these funds to productive investments. Also included are the introductions of new crop types and non-agricultural sources of income to compensate for what has been lost as a result of dam construction and impoundment. Training, demonstration and support services were offered for the introduction of new income generating activities (beekeeping, greenhouse, cucumber and mushroom culture, fish hatching, turkey farming etc.)
- Spatial component: In this component, the first principle was to identify new settlement areas in the same region in line with the preferences of the people. Then, with the participation of people, new places of settlement were determined. Actual settlement in these places took place, depending upon the preferences of the people concerned, through technical and/or credit support to those constructing their houses or settlement by the means of the State.

5. Results of the Mitigation Measures

Although many efforts have been given to rescue the Zeugma archaeological site, one third of it remains under the water. However those remains were protected before inundated of the area by the reservoir lake. They are left for future generations. Today people can visit the Gaziantep Museum and enjoy with the valuable pieces.

The issue of resettlement is quite difficult problem for any kind of projects. It is very difficult to get complete satisfaction from the people, one can say that the Birecik Dam resettlement project is a good example due to participatory approach and supplying some means of living.

There are 6,500 people and 850 households that have been affected by the reservoir lake. The government has fully paid the compensation to 850 households. The Government has initiated a new settlement (Karaotlak) for the inhabitants of Halfeti district centre, part of which remains under water. 220 families were resettled in Karaotlak (see Figure 9), 24 families were settled in Nizip-Gaziantep and one family chose to be resettled in Adana. On the other hand the government has supported 208 families who chose to build their own houses. People constructed their own houses with the credit and the Government constructed public facilities such as school, health clinic and shopping centre. For 16 families who were resettled in rural, agricultural land will be provided. There are still some people waiting for their new houses which will be constructed by the government. However, according to legislation the rent of their accommodation are paid by the government. In one village the General Directorate of Rural Services with the compensation funds constructed private houses. In case of the Karkamis Dam figures are not very high, mostly agricultural land has been left under water. The owners were compensated.

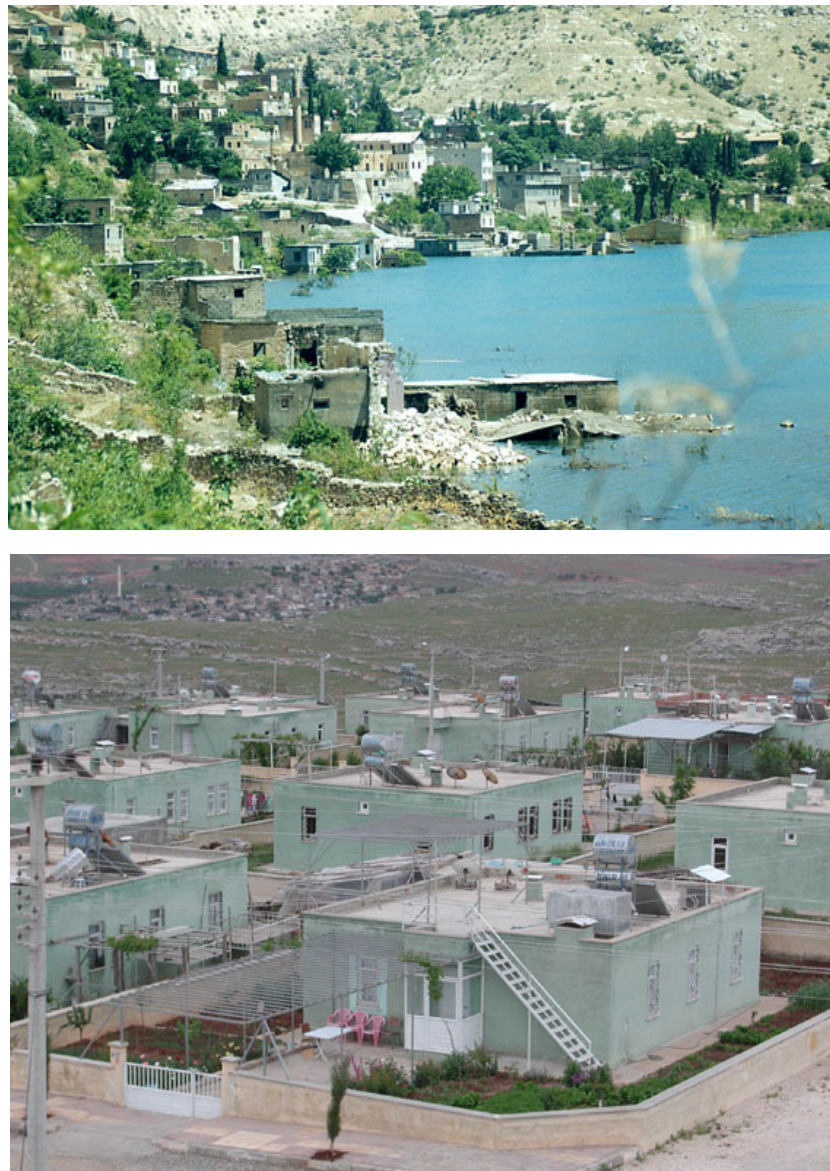


Figure 9: Old and New Halfeti

6. Reasons for Success

As mentioned Chapter 1 the goal of GAP is not only economic growth but also enhancement of the life quality of people leaving in the region. Several projects have been implemented starting 1995 following research and survey work on key parameters including demographic character of the region, priority problems and available resources. Among these projects are multi-purpose community centers (CATOM), rehabilitation of children working in the streets, social progress for youth.

The project launched in 1997 is “Resettlement, Employment and Economic Investment of People Affected by Birecik Dam” to help their resettlement and to facilitate their adaptation to new environment. The issue has social, economic and cultural aspects. The participatory resettlement project of the Birecik Dam are the results of the shifting paradigm in the GAP Project; putting human at the center.

Issues of cultural heritage are accorded priority with the objective to protect, rescue and promote components of cultural heritage in GAP Region while harmonizing this effort with welfare of the people. The Zeugma Archaeological project which was executed in 1999-2000 represents one of the largest and most ambitious rescue operations of its type. The project is internationally recognized and several teams of archaeologist and other experts from several countries have participated in rescue operation.

7. Outside Comments

Since Halfeti itself has fertile lands and has several historical places, inundation of Halfeti received attention from the media. Several reporters visited the places and wrote about Halfeti.

- 1) The Birecik Dam is famous at the international level because of Zeugma. However, Halfeti itself hosted several cultures backs to the 500 BC. The mosque Ulu Camii, built in 1844, House with Bath built in 1867, Latifzade Public Bath built in 1796 and two cemeteries remained under the water. Turkish version of the National Geographic underlined these facts on November 2004.
- 2) Critics related to future of the people of Halfeti published in an important newspaper called Hurriyet. (15 November 1998).
- 3) The region received attention from the public and tourism activities increases. The remaining part of the Halfeti has still historical structures. However in order to increase tourism activities, there is need of investment. This fact was underlined in a Newspaper called Aksam on 16 November 2003.
- 4) Sources:
 - National Geographic, Turkey, Nov. 2004
 - Hurriyet, 15 Nov. 1998
 - Aksam, 16.Nov. 2003

8. Further Information

8.1 References

- 1) Yasinok, K., “A Case Study of Participatory Resettlement in GAP”, Republic of Turkey, Prime Ministry, Southeastern Anatolia Project- Regional Development Administration, Ankara, 2000.
- 2) “Final Master Plan Report, The Southeastern Anatolia Project, Master Plan Study”, Southeastern Anatolia Project - Regional Development Administration, Nippon Koei Co. Ltd. & Yuksel Proje A.Ş. Joint venture, Ankara, 1990.

- 3) “The Planning and Implementation Project for Resettlement, Employment and Economic Investments of the Population Affected by Birecik Dam”, Project Report, Republic of Turkey, Prime Ministry, Southeastern Anatolia Project- Regional Development Administration, Ankara, 1997.
- 4) “The Planning and Implementation Project for Resettlement, Employment and Economic Investments of the Population Affected by Birecik Dam”, *Assessment Report*, Republic of Turkey, Prime Ministry, Southeastern Anatolia Project- Regional Development Administration, Ankara, 2000.
- 5) “Zeugma: a Bridge from Past to Present GAP”, Republic of Turkey, Prime Ministry, Southeastern Anatolia Project- Regional Development Administration, Ankara, 2001.
- 6) Planning and Application Project of Resettlement and Economical Investment of People Affected by Birecik Dam, <http://www.gap.gov.tr/Turkish/Dergi/D9152001/yyerles.html>.
- 7) Web sites:
<http://mertozyigit.sitemynet.com/ilceler/birecik.htm>
<http://www.sipesifik.com/uzmanlik/gezi/dosya/gezi/turkiye/4.html>
http://www.tempodergisi.com.tr/life_style/05417/
<http://www.bizim-mig.com.tr/arsiv/10/10-17.asp>
<http://nedir.antoloji.com/g.asp?terim=4521>

8.2 Inquiries

Dr. Şahnaz Tığrek
Middle East Technical University
Civil Engineering Department
Ankara
Turkey
Tel: +90 312 210 5451
Fax: +90 312 210 1262
E-mail: sahnaz@metu.edu.tr

This case history of hydropower good practice is published for educational and informational purposes only and may not be used for any other purpose. Duplication for commercial purposes is prohibited. The author(s) of this publication make no express or implied warranties concerning this case history, including no warranty of accuracy or fitness for a particular purpose.