The geography of lake tortum district (north - eastern anatolia)

İBRAHİM ATALAY

The lake Tortum, which was formed due to landslide and its immediate surroundings, is most striking area in terms of both physical and human geography of Turkey, Indeed the area, which found within Mescit-Ala Mountain ranges of the northern Anatolian orogenic belt, is located in the Tortum district the Erzurum province (vilayet). The lenght or dammed lake is about 7900 m., its width vary between 550 and 1700 m and its height is about 1010 m and the maximum depth is nearly 90-95 m.

The area deeply dissected by the Tortum stream and its main tributaries, very rugged terrains, the villages which were settled along the valley bottoms and edges, the temporary settlements ranging at the height of 1050 and 2200 m., and the economic system depending upon agriculture and animal husbandry and insufficient arable lands form the main characters or properties of the study area.

In this article, the main physical and human geography of the mentioned area will be summarized.

1. NATURAL ENVIRONMENT

1.1. Geological structure

The geologic substratum is composed of ophiolite containing serpantine, peridotite, spilit, pillow lavas, radiolarite etc. and outcropped on the eastern and southern part of the area. Cretaceous alternating flysches and clayey limestone strata overlie on the ophiolite. In the southern part of the area Eocene flysches containing **Sphaeogysina** sp., **Discocyclina** cf., **Nummulitaca** GÜMBEL, **Nummulites** cf., **helveticus** KAFFMAN, **Operculina, Rotalia, Assilina** cf. **expones** SOWERBY, **Nummulites** cf. **millecaput** BOUBEE fossils are found (Photo 1).

The Tav mountain rising look like a pramide, is composed of trachite. Cretaceous and Eocene flysches, limestone and clayey limestone strata form anticline and syncline structure in direction of NE-SW (Photo 7).

On the eastern flank of Çağdet and Tevin Mountains Neogene or Plio-quaternary deposits which are composed of marl containing limestone gravels and conglomerate, breccia to be weakly cemented are seen.

Quaternary deposits are composed of deltaic deposits of Lake Tortum and dejection cones. (Photo 7).

1.2. Geomorphic properties

In the area there are great elevation differences within the short distance due to the fact that the orogenic belt was deeply dissected by the Tortum steam and its main tributaries. For example, the relative elevation between the Tortum valley (800 m.) and Kemerli (2270 m.) Tevin Mountain (2409 m.) is about 1500 m. (Figure 1).

From the standpoint of physiographic, investigated area can be divided into three main units: 1- Mountainous areas, 2- Valleys and 3- The Lake of Tortum and its alluvial plain.

1— **Mountainous and high areas** : As a whole the mountainous areas involving Mescit-Ala mountain range forms the main part of the Northern Anatolian orogenic belt. This orogenic belt had been cut by Çoruh river and its main tributary named Tortum stream since the Oligocene time, at least. As a result of these fluvial eroding, the original surface of the area was dissected more than 1000 m. Indeed the heights of the mountains rising abruptly along the Tortum valley is more than 2200 m: Kemerli Mountain 2770 m, Çağdet M. 2502., Boz M. 2255 m., Arafek M. 2428 m., Tevin M. 2409 m., and Güllübağdat H. 2938 m. The slopes of the mountains have steep slopes and their inclination is more than 30 per cent. On the other hand the slopes made up less-cohesive materials such as flysches were dissected by the gullies and seem the same as bad-land topography. These lands are widespread on the southern slopes of the Çağdet and Tevin Mountains.

There are some undulating and flat surfaces at the different elevations coinciding with erosion surfaces or cycles and syncline axes. For example, these surfaces extend at an elevation of 2000 and 1500-1750 m. Generally some temporary settlements which are called mezraa are settled on these surfaces. For example, Misnik mezraa is found on the flat surfaces which developed on the syncline axe. The high mountains, on the other hand, coincide with the anticline and homocline ridges.

467

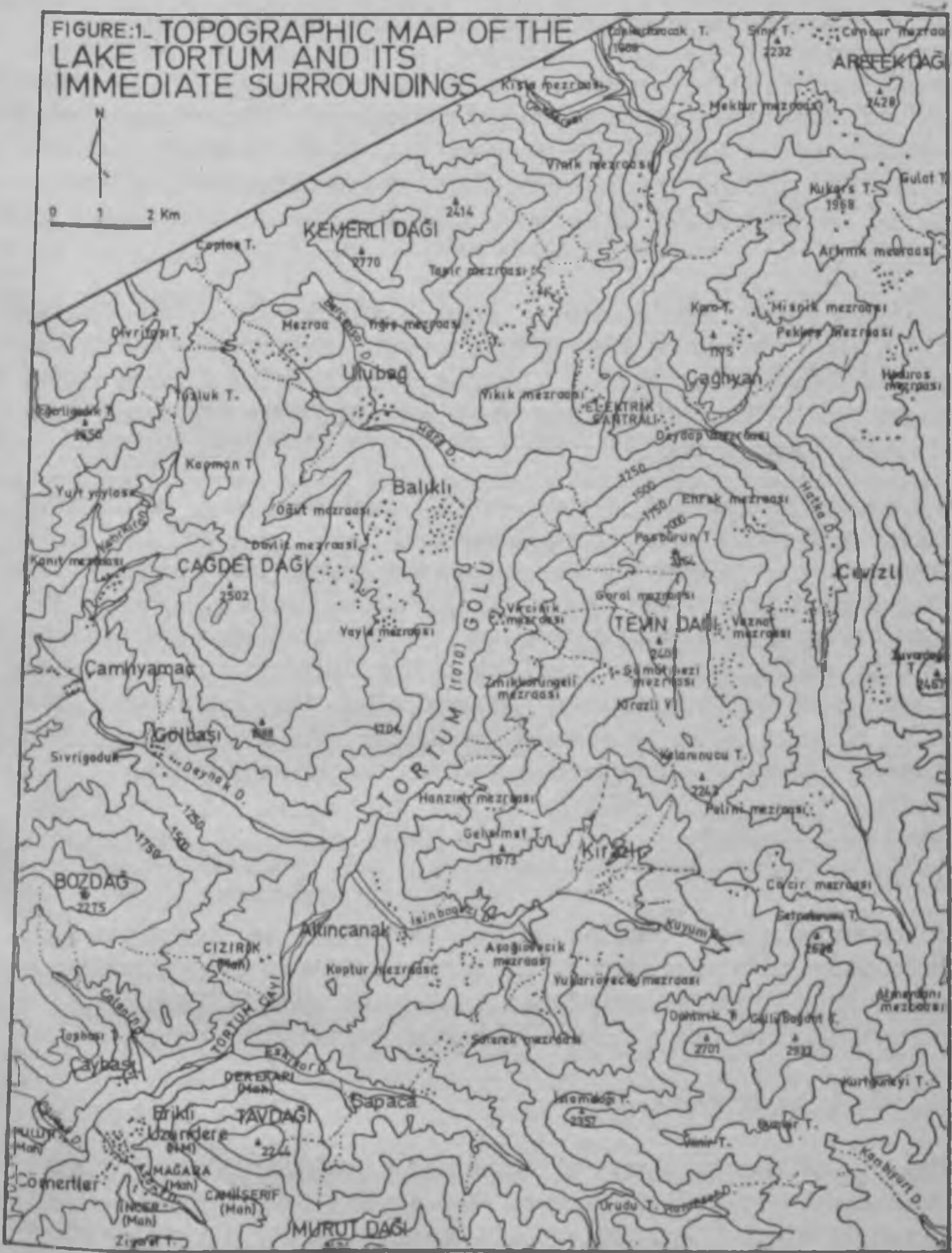

Figure 1. Topographic map of the Lake Tortum and its surroundings

2— **Valleys and drainage pattern :** As a general rule, the topography of the area was affacted by the fluvial erosion and structural features. Indeed, the drainage which had been conformed on the original surface of the area dissected the fold axes in vertical and cross direction. For example, the Tortum steam cut off the synclinal and anticlinal axes extending in direction of NE-SW, and Cevizli stream also has incised the eastern anticlinal flank of the Tevin Mountain anticline. At the same time, the anticline which is found in the SW part of the area was dissected by the Kirazlı stream (Photo. 3).

Different valley shape occurs, most of which are in «U» shaped which were formed on the limestones and the others are in «V» shaped on the less-cohesive flysches. These valley figures reflect severe pluvial erosion that had been prevailed since Oligocene time, at least. (Photo 4 and 5).

As to the drainage system and its evalution, as a whole after Cretaceous and Eocene formations had been emerged the initial drainage was established. After drainage system had developed the orogenic activites begun and so pre-Neogene formation was folded, and folding system was deeply cut by the running water. İndeed, incising and/or cutting of the folds in the different direction reflect these events which have been occured after the Oligocene. Subsequent streams were developed along the contact line extending between ophiolites and flyches and on the anticline flanks. As a result of these processes cuestas and homoclinal ridges had been developed especially on the anticline flanks and weak contact zones. (Photo 2).

In the same places because of the fact that the anticlines have completely cut and eroded by the streams the syncline stand up is higher level than the anticline. As a result of this fluvial eroding process the reversing of the relief and/or topography brought about.

3— The Lake of Tortum

The lake of Tortum is one of the biggest landslide lakes of Turkey. The weathered flysch deposits on the eastern flank of the Kemerli Mountain which is located eastern part of the Tortum valley slided into the Tortum valley. Indeed, the eastern section of Kemerli Mountain is an antlicline flank with the dip of clayey limestone towards the west at the degree of 25-35. After landslide, the Tortum valley was completely filled by the slumped materials. The thick-

ness of the slumped materials is up to 300 m and its lenght is nearly 2090 m., and its wideness is about 1200 m. The volume of the slided mass is approximately 200 millions cubic metre (Photo 6).

According to this field study, the longness of the lake was estimated to be 18 km when it had formed, and the southern limit of the lake was reached as far as İngüzek locality. In the northern end of the lake the maximum depth was estimated about 200 m because in this section the height of the valley bottom is nearly 800 m. while the water level of the lake is about 1000 m.

After the lake had been formed the water of the lake was flown on the slumped material and these materials were eroded and so the substratum, is composed of clayey limestone, was exposed due to eroding of the slumped materials. The Tortum waterfall was formed due to backward erosion of Tortum stream.

On the basis of the depth measurements which was taken in June 1980, the deepest part of the lake is about 90-95 m at the northern section of the lake and that section is determined to be flat. The middle section of the lake was separated by the dejection fans which had been originating from the torrent basins of the Tevin and Çağdet Mountains. There is small basin at the eastern section of this area and its depth is attain as deep as 78 m., at the end of the lake the depth is less than 25 m. In July the temperature of the surface water of the lake is about 20-22°C, while in the bottom the temperature is some 4-6°C.

At the present time, the lenght of the lake is about 7900 m, its width changes between 1700 and 525 m, the water capacity or volume is nearly 3 750 000 cubic meters.

The siltation of the lake basin

The draniage basin of the Lake Tortum is the highest erosion basins of Turkey. Indeed because of the fact that most of the forest lands have been destroyed, the forest and meadow lands have been converted into agricultural areas, over grazing system have been continued lead to severe erosion. On the other hand the existence of less-cohesive deposits such as flysches and dejention cone and fans and very steep slopes and etc. are the main cause of the intense erosion events. In the other words, slightly and/or flat lands are seen on the old erosional surface, the inclination varying 0 to 8 percent covers an area of 8 percent of the total land, while the inclination more than 20 percent covers 74 percent of the given basin. The slope groups were given in table 1.

445

Table 1: Slope groups of the Tortum drainage basin

Slope group (%)	Area (hectar)	Ratio (%)
0—3	4 777.25	2.7
3—3	9 531.09	5.3
8—20	31 721.66	17.3
< 20	152 628.93	74.0
Lake Tortum	559.50	0.3
Total	179 218.43	100.0

On the other hand, the less-cohesive parent materials such as Cretaceous and Eocene flysches and the Oligocene-Miocene salty and gypsyum formations which are found in the vicinity of Tortum district, dejetion fans and slope debris deposits are being dissected by the gullies and these materials are being easily carried away by the surface or overflow waters and torrents. These especially fine material derived from the above mentioned formations are being accumulated in the lake basin, in excess amount. The amount of the suspended sediment transported by the Tortum streams into the lake was estimated about 1 759 000 cubic metre or 3 695 000 tons/year at the Dikyar localite which is located five kilometres south of the lake (Güresinli 1978). At this localite, the lowest amount of suspended material is nearly 0.15 tons/day in Fabruary and the highest is about 163 000 tons/day in july. In addition, some streams which are flow into the Lake of Tortum transport sediment changing from fine material to boulders. These sediments accumulated into lake of Tortum were supposed to be more than 120 000 m^3/year. As a result every year 2.5 milion m^3 sediments are accumulated in the lake basin. Due to the fact that intense sedimentation continues in the lake, the growing of the Tortum lake delta is rapid. For example, during the period of 1947 and 1980 the growing of the delta was measured as 325 m; it is said that the yearly advence of the delta is much more than 10 metres. Consequently it can be said that the lake Tortum would be completely filled in next 200-250 years.

1.3— Climate

There is no adequate data to examine the climatic pericularities of the area. On the basis of the area, the mean annual temperature of the lower section of the area might be estimated 12-14°C. The figure for 1500 m hight is about 8-9°C and for 2000 m is nearly 6-7°C and for 2500 m. 3-4°C. July temperature is over 20°C, The winter

temperature of the bottom section of Tortum valley falls down freezing point rarely.

The mean yearly precipitation is about 300 mm and most of which falls during the spring and early summer season. The rainest months are May, and June.

Dominant wind direction is northern sectors. These winds bearing plenty moisture that originating from the Black Sea, decrease the evapotranspiration. That is why, on the slopes facing north are most covered with the scotch pine forests. Shortly, semi-arid climate prevails along the Tortum valey and its main tributaries, and sub-humid condition begins after 1500 m.

1.4—Soils

The fact that the area has rugged and steep slopy topography and the destruction of the natural vegetation have brought about the intense erosion For this reason, except for some undulating and flat lands and areas that were covered with the scotch pine, the soils are being carried away from the original areas, and also normal soil profiles are not seen.

The brown forest soils showing A and B horizons only occur under the good stands of Pinus sylvestris and their humus attaining 1-2 cm thick are in mull form. A horizon is rich in organic content and is in loamy texture and in granular structure.

B horizons are not well developed and there is calcium carbonate accumulation and show notral and weak alkaline reaction. Dominant soils of the remaining areas, except for valley bottom and sub-alpine areas are intrazonal soils and/or lithosols. And most of the these areas limestone and flysches were outcropped due to intense soil erosion. In the limited part of the upper section of the Tevin and Arafek Mountains there are high mountains and meadow soils which are rich in organic content. The hydromorphic and alluvial soils occur on the deltaic plain of the Lake of Tortum.

1.5— Vegetation

The natural vegetation cover has been destroyed in considerable amount of wrong land-use, cutting of the forests and over grazing. For this reason, the natural occurence of the dry **Pinus sylvestris** forests were greatly damaged and/or changed. As a result of these events the areas in places natural equilibrum were mostly deteriorated and were mostly occupied by weeb species (Figure 1).

From the standpoint of phytogeographical region in the studied area the elements of Euro-Siberian, Mediterranean and Irano-Turanian are found. But as a whole the area is within the Euro-siberian phytogeographical region. The climatic changes that had been occured during the Pleistocene and Holocene led to remain different phytogeographical elements and during these times the elements belonging to the different region had been shifted away one to another.

Natural vegetation of area can be examined into three belts or levels.

Irano-Turanian steppe and Mediterranean shrub communities :

Dry and stony and/or lithosol areas of the Tortum valley are very sparsely covered by herbaceous and some shrub elements. Leading Irano-Turanian elements are **Crataegus pseudoheterophylla, Silene armena, Veronica oltensis Atraphaxis grandiflora,Astragalus ispirensis, Stipa barbata, Cotoneaster transcacicus.**

The elements belonging to Mediterranean are **Cotinus coggyria, jasminum fruticans, Cerasus prostrata, Anthemis triumfettii, Paliurus spina-christi, Capparis spinosa, juniperus oxycedrus, Caragane grandiflora** etc. **Morus** sp. and **juglans** sp. are found along the valleys.

Forest vegetation : The forests are composed of **Pinus sylvestris** and **juniperus** sp. As shown in Fig. 2 Forests of **Pinus sylvestris** commence at about 1100 and 1200 m and rise as high as 2400 m and common on the slopes facing north. **Pinus sylvestris** forests having in good stands are seen in the vicinity of Mekpur-Cocur temporary settlement and on the northern slopes of Tevin Mountain.

Juniperus communites, on the other hand, extend between 1500 and 1700 m on the slopes facing south Leading juniper species **Juniperus comminus, J. oxycedrus, J. foetidissima.** The height of some junipers attain as high as 5 to 6 metres and their diatemers are excess 100 cm. **Veronica aragallis-aquatica, Enula oculus-cristi, Erigeron acer L.** subsp. **acer, Fragaria viridis, Solanum dulcamard** L. var, **indivisium, Campanula betulifolia** belonging to Euro-Siberia region are found on the slopes facing north, wet ground and encountered as underground flora of the **Pinus sylvestris** in high elevation.

Deep and narrow Tortum valley restricted some vegetation species and these species retained due to strict isolation condition. For this reason Tortum valley has a lot of endemic species belonging to some flora region. For example, the endemic species which are found within the Irano-Turanian region are **Silene armena, Vero-**

nica oltensis, Atraphaxis grandiflora and **Campanula betuliflora** belonging to Europea-Siberian, and **Anthemis triumfettii** belonging to Mediterranean are seen within the Tortum valley.

As regard to present climatic conditions are being prevailed in the area, it can be stated that some species are in relic character. For example, some Mediterranean shrubs such as **Paliurus spina-christi** forming communities along the Tortum valley are of relict. At the same time, some Euro-Siberian elements as well are in relic position. These relic elements and communities are clearly reflect the climatic changes that had been occured during the Pleistocene and Holocene time.

2. HUMAN GEOGRAPHY

2.1— Settlement History

The settlement history of the area was dated as back as about 2000 B.C. The first Turkish tribe which had dwelled, was called Saka and the tribe invaded and spread all over the Kura and Çoruh river basins. The tribe was living as nomad. The main livelihood of the tribe was depending on nomadic life. Tavok and Tav slaves of Saka Turks lived and dwelled in the districts of Oltu, Olur, Göle Narman and Şenkaya.

The region was conquered by Med in 585 B.C. then Selevkos in 220 B.C. After Rome Empire had collapsed, the region was influenced by Byztine Empire. During that time Gürcü tribes lived and engaged in the agriculture and animal husbandry. The church which was build by Georgians in 978 B.P. and it found at the çamlıyamaç village reflect the Byzantine culture.

After 1048 the area was occupied by Seljuk Turks and in 1240 the area was invaded by Mongols. In 1400 the area was conquered by Timur and then invaded by Karakoyunlu, and after the victory of Çaldıran war, Eastern Anatolia including Tortum district had been ruled by Ottoman Empire.

In the war that was broken out between Russia and Ottoman Empire in 1877-1878, the area was occupied by Russia and the native people of the district migrated towards the internal section of Anatolia and that period Armenians were settled the area by Russia. In 1928 the whole area again was gained by Turks. With the establishing the Republic of Turkey the stable period has been realized. Agriculture and/or arable lands are very limited due to the fact that the area is very rugged and cut by deep valleys. That is why, the natural environment mostly restricted the developing of the different culture.

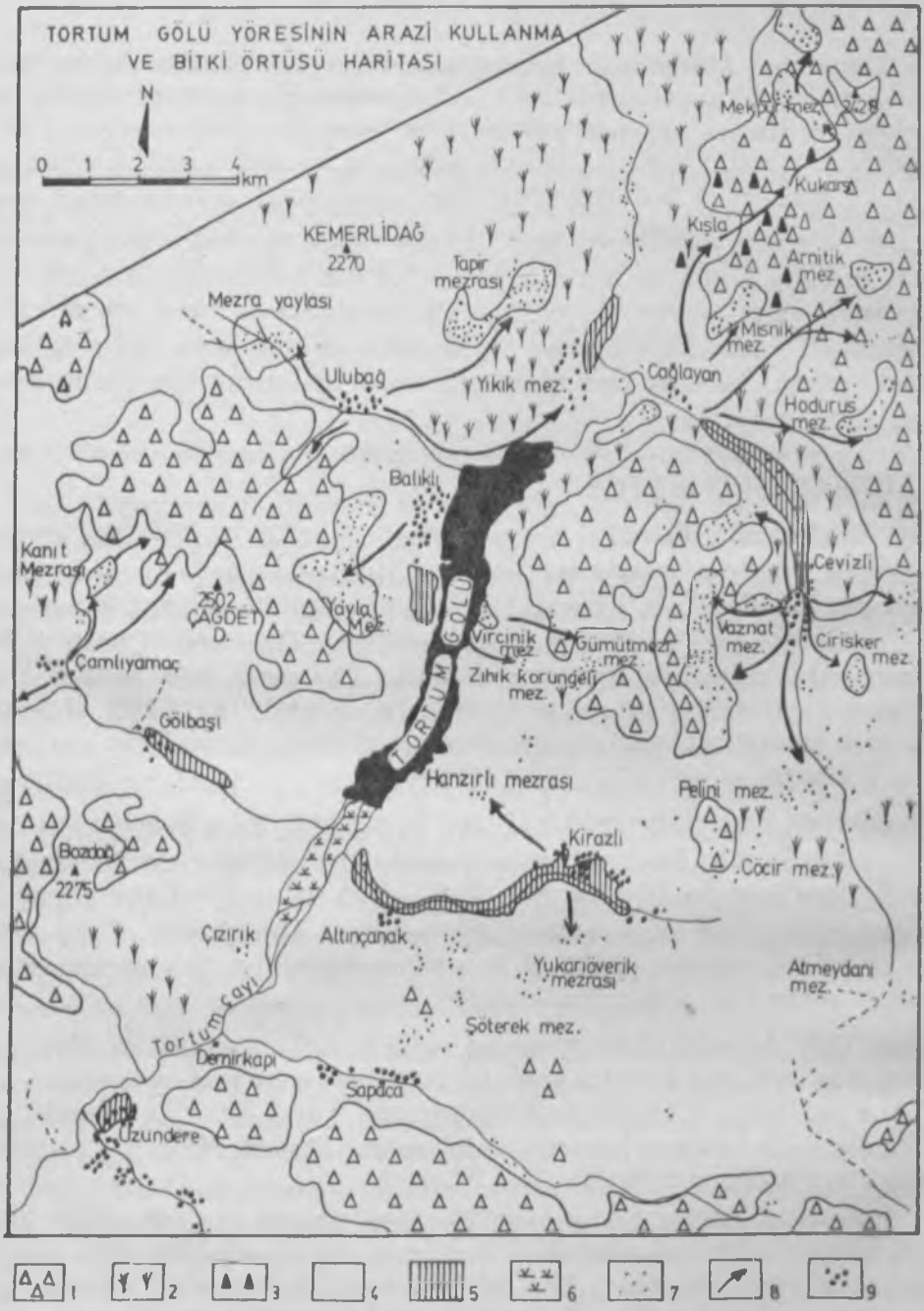

Figure 2. Land-use and vegetation map of the Lake Tortum district. Explanatory: 1— Forests of scotch pine (Pinus sylvestris), 2— Shrubs containing Paliurus spina-christi, 3— Juniper communities. 4— Bare lands and antropogene steppe areas, 5— Irrigated agricultural lands, 6— Meadows, 7— Temporary settlement (named mezraa) areas and dry farming areas, 8— The paths of mezraa's, 9— Village settlements.

2.2.— Settlement Types and Houses

In the research area there are ten village type settlements and one of them has a municipalitiy. These villages were situated in the valley bottum, near the valley and at the lower section of the steep slopes, The village type settlements are Çağlayan, Balıklı, Cevizli, Ulubağ, Çamlıyamaç, Altınçanak, Gölbaşı, Sapaca, Uludağ. Amongst them a temporary settlement named Yıkık mezrası which is situated in the north of the lake of Tortum was coverted into permanent settlement and Tortum hydroelectrict power and its plant is some modern type.

Nucleated and/or centered village systems are dominat although the houses of the some villages climb up to slopes look like stair steps due to lacking of the sufficient area. On the other hand, in this area, the slopes divided into several parts by the small greek lead to cluster settlement types containing between 3-5 and 15-10 houses. Each cluster settlement called «mahalle» is typical settlement type along the both Tortum valley and Çoruh valley. For example Kirazlı village has seven «mahalles» each of them is found on the slopes which was seperated by stream valleys. The settlement type extending along the streams such as Cevizli and Gölbaşı village is in a small groups (Photo 8).

As to the plan of the houses, as a general rule, there is a hole and two sitting rooms extending either side of the hole and a cellar or store room, and at the end of the hole a kitchen having a kitchen-range-oven, is found. Stable (for houses) and a straw-shed is quite common to be situated near to the house and rarley is found adjoin the house. The new build houses have two floors, the first floor is occupied by stable and straw-shed, and the second floor has sitting rooms. The house which consist of two sections one section is devoted to dinning room and the other is straw-shed and stable. The houses of the villabes being far from the forest lands were constructed with stones and mud-bricks. But the dominant constructional materials of the newly constructed houses were composed of stones and mud-bricks; and these houses are generally two floors. The using materials in the house construction depend largely on living standart of peasants. For example, the houses of some rich families were constructed with reinforced concrete. Indeed there are modernlike houses which were established during the recent years in the village of Çağlayan, Kirazlı, Uzundere and Balıklı, while most of the houses of the Çamlıyamaç, Cevizli, Sapaca, Uludağ and Çağlayan are wooden.

Uzundere town which is situated on the dejection fans originated from the Mususi stream and having gathered settlement type as small clusters and having munucipal is vigorous center of the district. The grocers, green grocers, blacksmith and tailor being scattered along the main streets supply the needs of the town and its immediate villages.

Temporary settlement, which is called Mezraa in Turkish settlement terminology, is common both in the investigated area and the other rural areas of Turkey. Each village has a few mezraas.. The fact that agricultural areas are insufficient lead to the developing of the secondary settlement types which are only ocupied during the summer months at an elevation of 1000-2000 metres. In these settlement areas both animal husbandry and small-large agricultural activites carry out (Photo 9, 10).

With the beginning of summer temeperatures rise up, some peasants migrate up to the highland temporarily for living and working between May and September. These settlements were occupied during the summer, each family has a house which was build up with the wood of scotch pine and Juniper. These houses contain two sections, one of them is dinning room and the other is fold or pen in which animals stay (Photo 10).

The most impartant mezraas in terms of both animal husbandry or cattle breeding and productive agriculture are Concur, Mekpur, Mişnek, Vaznat and Gümütmezi.

2.3— Population

As shown in table 2, the population increase of the district is very low during the period of 1955 and 1985. But in the period of 1960 and 1970 the population increased by nearly 2 per cent and while especially after 1970 the increasing of population slowed extremely. The population of Uzundere, Çaglayan, Çamlıyamaç villages decreased between 1975 and 1985. The main reason of the decreasing of population is the internal migration. As it is known, in Turkey after 1950 developing of road networks and establising of the new industrial plants have caused the increasing of the internal migration.

According to the field research, during the last decade ten families from Balıklı, twenty families from Çağlayan, thirty families from Altınçanak and seventy to eighty families from Cevizli villages migrated to the big cities such as İstanbul, Ankara, Erzurum,

İskenderun, For example, after the stell and iron plants of İskenderun had established 100 persons from Cevizli, and 75 persons from Çağlayan migrated to İskenderun in order to work. Also migrant workers working abroud are over 100 persons as well.

2.4— Economic activities

The main economic activities or livelihood of the district people are depended primarly on agriculture and cattle-breeding.

2.4.1— Agricultural activities : Leading agricultural activities depend on the growing of wheat and barley and cultivating of vegetables. In the irrigated areas following vegetables are cultivated: tomato, onion, patato, peper, cucumber; and fruits are apple, cherry, pear, mulberry, apricot, morello cherry, peach, walnut. Most of the vegetables and fruits are being consumped by peasants while some fruits such as apricot, walnut, cherry, morello cherry are being exported.

Wheat and barley cultivation largely carry out in tne mezraas, for this reason the mezraas can be named the grain store of the area. The production rate of the cereals are very low due to soil and weathered parent material erosion. Indeed, the production rate of wheat is about 150 to 200 kg/decar and barley is nearly 200 to 250 kg/decar in the Vaznut, Mişnek, Mekpur and Tapir mezraas. The poductivitiy of the remaining areas decreases as low as 100 kg/decar in wheat and 150 kg/dec. in barley.

In order to supply the cereal requirements the peasants of the area cultivable suitable areas up to the region where their oxen can plough. The areas which are not sufficient for agriculture have been converted into agricultural areas in times. Each village has a few mezraas, for example Gölbaşı, Çamlıyamaç, Balıklı villages has nine mezraas, Kirazlı has ten, Çağlayan has thirteen, Cevizli has six and Ulubağ has three mezraas.

2.4.2— Animal husbandry : As a general rule, each family has a double ox bullock, a few cows (one to five), and sheep and goats. Animal husbandry is in primitive character. As a matter of fact, animals graze in the vicinity of villages, pasture lands, along the valleys, mezraas and subalpine pastures. In accordance with the «yaylacılık» activities, animal flocks go up to mezraas and highland especially at the and of the spring and the flocks graze during the summer months and then the flocks come back to their own village especially at the end of September. Animals are shel-

tered and/or accomondate in the stables during the winter period, and this period some animal flocks go to the low parts of the Çoruh river valley in order to graze, because mild climate prevails along the low section of the river valley.

There is rotation system both in agriculture and animal husbandry activities on the mezraa areas. Mainly each village is seperated into two spare parts of its own mezraa. The mezraa areas which were divided into two sections are under different utilization system. One year one part of the mezraa devotes to grain cultivation, and the other part is left to graze, when the following year the grazed part of the mezraa coverts to cultivation area and cultivated area open to the utilization of animal grazing.

On the other hand in the cultivated mezraas after the grain is harvested the areas are open to graze. So, in the mezraa areas the rotation and/or following system prevails.

According to data obtained from the area inquiries, the population of goats are about 12 000, sheeps are 10 000 and cows are nearly 3000. The animal production marketting is very low because these productions are completely consumpted by the peasants. The families obtainig livelihood from the cattle-breeding sell animals and animal productuons for example butter, sheep-wool, goat-hair in small quantity.

In generally, in the investigated area, the revenue obtained from the agriculture and cattle-breeding is insufficient to seccre the livelihood of villagers. That is why there are economic difficulties. For this reason, one-two persons of every family of the villages except for Çağlayan and Kirazlı village go to work the city of Rize, İstanbul, Erzurum, Ankara, İzmir etc. in order to gain additional revenue. These workers are mostly employed in the construction sector. After these workers had worked a few months in several fields, they come back their own villages. This temporary workmanship is termed as «gurbetçi». The approximately number of these workers are 50 to 60 from Gölbaşı, 150 from Çamlıyamaç, 25 25 from Altınçanak, 200 from Kirazlı, 50 from Balıklı, 200 from Cevizli, 150 to 200 from Ulubağ villages The most important point is that the workers of Ulubağ village are engaged in electrification works of rural areas.

Hydroeletric power of Tortum

The hydroeletric power of Tortum securing the energy in terms of in all cases was established on May 15, 1960. The power was set

up at an elevation of 793 m in the recent bottom of the Tortum valey which was opened by the new course of the Lake after the landslide had been taken place.

The water operating the power come from the Lake at the height of 994 m. via letting flow tunnel, runs the power turbine which is found at elevation of 793 m. Relative height of waterfall operating the power is about 194.6 m. In this power plant there are two turbine in power of 7880 P.S. and three generator in power of 7000 KWA Electric energy produced at the power plant is transmited to Erzurum and is connected to interconnecting electric network of Turkey The mean annual electrict production of the power plant is nearly 100 million KWH. In this plant 49 full-time personnel and 25 (sometimes 30) temporary workers are employed. With the production of electric energy, the villages in the vicinity of the plant started to receive this power at their pingertips.

Table 2: Population and annual increase by years in Tortum district

	Census Years							
Name of villages	1955	1960	1965	1970	1975	1980	1985	total increase during the last 30 years
Uzundere	2092	2106	2524	2997	3127	2900	2877	785
Altınçanak	170	189	228	269	267	295	332	162
Balıklı	432	516	567	610	668	754	739	307
Cevizli	1104	1272	1407	1613	1470	1476	1489	385
Çağlayan	485	353	498	542	605	568	506	21
Çamlıyamaç	692	808	907	915	942	968	923	231
Gölbaşı	653	649	668	798	752	794	786	133
Kirazlı	808	941	1014	1124	1298	1204	1210	402
Sapaca	590	662	728	728	732	789	756	166
Ulubağ	754	870	989	1014	1243	1281	1362	608
Total population	7780	8366	9530	10610	11104	11029	10980	3200
Annual intercensal İncrease %0		15,1	27.8	22.7	9.3	—1.4	—0.9	

(Note: Mean Annual population increase rate of Turkey is about %0 27.85).

Photo 1. General view of Eocene flysch on the SE part of Lake Tortum.

Photo 2. A valley named Katırkıran opened a contact line between flysch and ophiolite, and cuestas on the eastern slope of the valley, on the north of Çamlıyamaç village, W of Lake Tortum.

Photo 3. An anticline incised by Kirazlı stream valley on the east of Kirazlı village, SE of Lake Tortum.

Photo 4. A canyon valley formed on the anticline flank of Tevin Mountain N of Lake Tortum

Photo 5. Canyon valley of Tortum stream opened on the anticline flank of Tevin Mountain composed of Mesozoic limestone. Fruit and vegetable gardens are found on the bottom of the valley.

Photo 6. A general viewof the Tortum valley in which Lake Tortum was formed due to landslide.

Photo 7. A general view of the southern part of Lake Tortum and its delta and deltaic plain, and Tav mountain made up of trachyte in the background. Photo taken in June 1980, the highest level of the lake occurs in June or May.

Photo 8. A small cluster or nucleated settlement type of the Uludağ village settled on the slopes due to narrowness of the places (NW of Lake Tortum).

Photo 9. A general view of the temporary settlement type named Vaznat mezraa in which agricultural and animal husbandry activities carry out on the northern slope of Tevin mountain at an elevation of 2000 m and degreded and/or destroyed forest of scotch pine (Pinus sylvestris) is seen in the background.

Photo 10. A wooden dwelling (house) in the Mekpur mezraa, at an altitude of 2000 m, 9 km north of Lake Tortum. The house has two sections, one of which belongs to animals to/for shelter or refuge and the other section belongs to family of peasant (at right).

BIBLIOGRAPHY

(1) ACAR, A., 1975, *Tortum ve çevresinin jeolojisi ve jeomorfolojisi üzerine bir araştırma:* A.Ü. Fen Fak. Araş. Ser.: 30, Erzurum.

(2) AKSOY, A., 1981, *Tortum çevresinin ekolojik ve fitososyolojik yönden araştırılması:* Hazırlanmakta olan araştırma, Erzurum.

(3) ATALAY, İ., 1978, The sediment yield of some rivers of Turkey: Edebiyat Fak. *Araştırma Derg.*, 18, s. 193-197.

(4) ATALAY, İ., 1980, Türkiye'nin morfolojik ve jeolojik özelliklerinin aşınma ve birikme olaylarına etkileri: *I. Ulusal Erozyon ve Sedimantasyon Simpozyumu* Tebliğleri, DSİ, Yay.: 982, s. 60-70, Ankara.

(5) ATALAY, İ., KARAKAPLAN, S. ve KOÇMAN, A., 1980, *Oltu Çayı Havzasında Havza Amenajmanı Yönünden Araştırmalar:* TÜBİTAK Proje No: TOAG/377, Ankara.

(6) ATALAY, I., 1980, Geomorphology of the Lake Tortum and its immediate surroundings : *Review of Geographical Inst.* Univ. of. Ist., 16, p. 49-64.

(7) ATALAY, I., TETİK, M. and YILMAZ, Ö., 1985, The ecosystem of north-eastern Anatolia: *Aegean Geographical Journal*, 3, p. 16-56.

(8) ÇEPEL, N., DÜNDAR, M. ve GÜNEL, A., 1977, *Türkiye'nin önemli yetişme bölgelerinde saf sarıçam ormanlarının gelişimi ile bazı edafik ve fizyoğrafik etkenler arasındaki ilişkiler:* TÜBİTAK Proje No: TOAG/154, Ankara.

(9) ELİÇİN, G., 1977, *Türkiye'de doğal ardıç (Juniperus L.) taksonlarının yayılışı ile önemli morfolojik ve anatomik özellikleri üzerinde araştırmalar:* Orman Fak. Yay.: 232, İstanbul.

(10) GÜRESİNLİ, Y., 1978, *Tortum Gölü su toplama havzasında sedimantasyon sorunu ve kontrolu üzerine bir araştırma:* A.Ü. Ziraat Fak. Doktora Tezi, Erzurum.

(11) GATTINGER, T.E., 1962, *1/500 000 ölçekli Türkiye Jeoloji haritası Trabzon paftası ve izahnamesi*: MTA Enst. Yay., Ankara.

(12) HOLEMAN, J.N., 1968, The sediment yield of major rivers of the World: Water Reseourches Res. 4 (4), s. 738-745.

(13) LAHN, E., 1944, Tortum Gölü ve şelalesi: *Türk Coğrafya Der.* 3-4, Ankara.

(14) SALIA, K., 1973, La Géorgia du sud et du sud-ouest: *Bedi Kartlisa revue dekartvélogie*, XXXI, s. 151-166, Paris.

(15) TORTUM, SANTRALI, İller Bankası, 1965.

(16) SÖZER, A.N., 1972, *Kuzeydoğu Anadolu'da yaylacılık.* Tarhan Kitabevi, Ankara.

(17) TUNÇDİLEK, N., 1977, Türkiye'nin dağlık ve ormanlık bölgelerinin ekonomik problemleri: İ.Ü. Coğrafya Enst. Derg., 22, s. 43-52.

(18) TÜMERTEKİN, E., 1977, Türkiye'de iç göçler üzerine: İ.Ü. *Coğrafya Enst. Derg.*, 22, s. 29-42.

ÖZET

TORTUM GÖLÜ YÖRESİNİN COĞRAFYASI

Doğu Karadeniz Bölümü'nün güneydoğusunda Akdağ-Mescit dağları arasında yeralan yöre doğal, sosyo-ekonomik özellikleri ile ayrı bir ortam oluşturmaktadır. Tortum vadisinde bir heyelan sonucu oluşan Tortum gölü, halihazırda 7.9 km uzunlukta, ortalama 1 km kadar genişlikte, en derin yeri kuzeyde 90-95 m civarında ve 1010 m yüksekliktedir.

Tortum çayı ve kolları tarafından Eosen sonundan itibaren dar ve derin olarak yarılmağa başlayan yörede, vadi tabanı ile dağlar arasındaki yükseklik farkı birkaç km lik bir mesafe dahilinde 1000 m yi aşmaktadır. Son derece arızalı ve tipik jura tipi kıvrımlı yapının yeraldığı bu yörede, erozyon çok şiddetli olarak hüküm sürmektedir. Nitekim, 1 km² lik alandan bir yılda ortalama olarak taşınan malzeme miktarı 2500, Tortum gölünde bir yılda biriken malzeme miktarı ise yaklaşık 2.5 milyon ton kadardır. Her yıl delta göle doğru 15-20 m kadar ilerlemektedir.

Kışları nisbeten ılık geçen Tortum vadisinde Akdeniz kökenli çalılar, yüksek yerlerde güneye bakan yamaçlarda ardıç *(Juniperus oxycedrus, J. excelsa, J. foetidissima)* ve kuzeye bakan yamaçlarda ise sarıçam *(Pinus sylvestris)* toplulukları görülmektedir.

Akarsu vadilerinin içleri, kenarları ve yamaçların eteklerinde kurulmuş olan toplu yerleşme tipindeki köyler hakimdir. Yer darlığından dolayı, kümeler halinde bulunan mahalleler, yamaçlara doğru adeta merdiven basamakları halinde bir dizilme göstermektedir. Genellikle tek katlı olan meskenlerin bir bölümünde aile fertlerinin barındığı bir veya iki oda, bir kiler ve holun nihayetinde ocağın bulunduğu mutfak, diğer bölümünde ise ahır ve samanlık bulunmaktadır. Her köyün yaz döneminde geçici olarak iskan edilen bir veya birkaç mezrası bulunmaktadır. Sırt ve vadilerle ayrılan mezraların bir bölümünde bir yıl tamamen hububat tarımı yapılırken diğer bölümünde hayvan otlatılmaktadır, ertesi yıl tarıma ayrılan mezraa otlatmaya, otlatmaya ayrılan mezraa ise tarıma açılarak münavebeli bir sistem uygulanmaktadır.

10 adet kırsal yerleşme merkezinin bulunduğu yörede yaklaşık 11 binden fazla olan nüfusun ana geçim kaynağını tarım ve hayvancılık teşkil etmektedir. Ancak yörenin tarım ve hayvancılık potansiyeli nüfusu yeterince besleyemediği için bazı köylerde çoğu aileden bir veya birkaç kişi geçimini büyük şehirlerde yılın birkaç ayı çalışarak sağlamaktadır (gurbetçilik). Yörede aktif olarak göç hüküm sürmekte olup, en az dört köyde son 15-20 yıl içersinde nüfus azalması vardır .