The Damages Caused to Automobile Roads by Natural Disasters and the Measures of Protection in Azerbaijan Republic

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Abstract

The article deals with the study of destructive natural disasters and their di3885rect and indirect influences on automobile roads in the territory of Azerbaijan Republic. Analysis of economic and social-geographic problems of damages caused to the economy of Azerbaijan due to natural disasters is given. The measures of protection implemented in this connection are shown and scientifically studied. General social problems observed after the emergence of natural disasters are shown in short.

Key Words: Azerbaijan, transport, automobile roads, transport network, natural disasters, states of emergency, economic damage, State Program, infrastructure, global climate changes, environment

Data about the Study Object

The territory of Azerbaijan Republic is 86,6 thousand sq.km. The country is situated between 38º25′ and 41º55′ north latitudes, encompassing 44º50′ and 50º51′ east longitudes. The capital city of Baku is located at 40º north latitude, covering an area with nearly 400 km long from the north to the south and nearly 500 km width from the east to the west. The length of borders of Azerbaijan in tote is 2849 km, including 2024 km on land. The country encompasses south-eastern part of the Great Caucasus, some part of the Less Caucasus, Talish Mountains and Kura-Araz lowland among these mountains. The average height of the territory is 384 m, the highest absolute height is 4466 m (Bazarduzu peak), and the lowest altitude is 27 m below the sea level (Pre-Caspian areas). 18% of the studied territory is lower than the sea level, 39% encompasses lowland plains, 39,5% includes low and medium mountainous territories (up to 2500 m), and3,5% includes high mountainous areas (over 2500 m).

The Study of Problem

60% of the territory of Azerbaijan is mountainous and foothill areas where highways and roads are being destructed as a result of regular emergence of the natural disasters. The destructive natural processes also entail recesses in functioning of vehicles, development of economic areas related to direct and indirect damages. 'The State Program on development of transport system in Azerbaijan Republic' (2006-2015 years) has been adopted in order to minimize losses and implement preventive measures against natural disasters in transport infrastructure. The main attention in this Program is given to meeting requirements for areas of transport as well as motor transport, creation of sustainable transport system, enlargement of transitional potential of the country, improvement of quality of services in this area, reduction of transportation costs concerning both passengers and goods, and solution of other related issues. In the meantime, the regular reemergence of natural disasters and destructive environmental processes in recent years in connection with climate change necessitate conducting of economic and social-geographic studies on natural disasters in Azerbaijan. In this regard, it is notable that the studies on determination of economic losses are not completely carried out.

Highways as means of communication are significant integral part of transport service, and play considerable role in establishing connections between economic areas. Highway network of Azerbaijan consists of automobile roads of regional importance, and highways of larger scale and length. At present, the total length of the operating automobile roads and contemporary engineering buildings in this area (such as bridges, tunnels, etc.) makes up 18799 km, of which 4577 km falls to the share of highways of state importance, and 14222 km is shared by roads of local importance. In other word, 24% of generally used automobile roads has significance for only local administrative regions whereas the rest 76% is represented by main and medium highways. These are the official data of State Committee on Statistics.

In 2012, transportation of goods in tote made 234641 thousand tons in Azerbaijan, of which 10,1% was shared by oil sector. As the statistic data of 2000-2012 show, the transportation of goods has been increased in the country. The situation related to transportation of non-oil products has been changed differently. Thus, the transportation of non-oil products increased in 2000-2006, reduced in 2007, increased in 2008-2009, and decreased again in 2010-2012. 56% of transportations is shared by road haulage relates. By non-oil sector, the corresponding indicator is 60%.

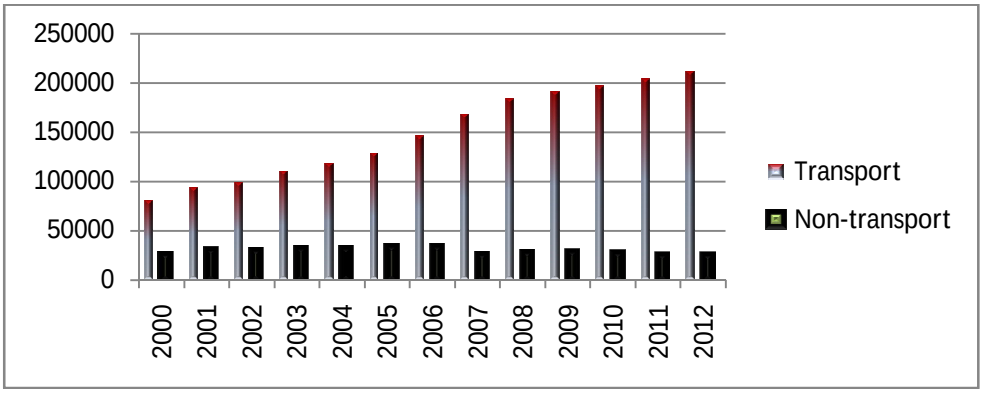

Figure 1. Transportation of Goods in Transport and Non-Transport Sectors (1000 Tons)

The conducted economic reforms in the country provided macroeconomic stability in recent years, allowing reach dynamic economic growth and improvement of social welfare. Economic and social reforms provided also stable development of the regions. In the meantime, population growth, changes in biological diversity, and also global and regional climate change as well as repeat of natural disasters negatively affect the development of economic areas. Taking this into consideration, it is necessary to study destructive natural disasters in detail, on the basis of which it is advisable to adopt special programs concerning fundamental prevention against adverse natural processes.

Repeating of natural disasters each year damages the economy of Azerbaijan averagely at 30-50 million manats. In some years, when natural disasters were more powerful and observed at the large scale, the economic losses made 150-200 million manats. It is not possible to completely prevent emergence of natural disasters, but the world practice is needed to be taken into consideration in order to reduce damages. In the condition of contemporary scientific and technical progress, the possibilities of managing natural disasters are greater.
It is mentioned in the 'State Program on Renovation and Development of Automobile Road Network in Azerbaijan Republic' (2006-2015) that 87% of automobile roads became nearly non-usable in the country. 26,2% of the overall automobile roads are asphalted and concreted, 13% are black-covered, 46,7% are gravel-covered, and 1,1% are soil roads. The total length of non-usable roads is over 15 km, and the length of roads with bad condition is over 4,6 thousand km.

Automobile roads existing in the mountainous and foothill territories are included in 'category of local importance'. These roads play significant role in creation of economic relations between the rural settlements and the centers of administrative regions as well as primary industries and processing areas. Technical indicators of the roads of local importance do not answer contemporary standards. Because of bad condition of highways, relief and climatic condition as well as natural disasters like flooding or landslides, the connections between villages and cities are impeded, causing disruptions particularly during winter seasons. Adverse environmental condition affects quality of roads.

As for lowland territories, highways and small automobile roads are regularly being affected by heavy rains and winds, and also inundations. Frozen condition is also responsible for destruction of roads. As the carried studies show, both natural and anthropogenic factors entail emergence of natural disasters in the lowland territory of Azerbaijan as a result of which roads are being damaged. It also should be noted that time of emergency of natural disaster is undefined as usual, and this complicates effective activeness against it.

Many works concerning improvement of transport system of Azerbaijan has been implemented in recent years.

This process is underway: new highways, bridges and conductive lines are being constructed, allowing improve interregional transport connections. In the meantime, states of emergency observed sometimes in motor transport because of destructive natural processes, may create socioeconomic and ecological challenges in the regions.

In these regards, damages seen by automobile roads can be divided into two groups: 1. Damages taken place as a result of environmental degradation. 2. Damages caused by human activity.

Destructive natural processes impede stable development of regions, leading to emergence of economic and social problems. In the country, incorrect calculations may be faced when determining damages and losses caused to roads by natural disasters. In practice, economic losses after arising of natural disasters are calculated on the basis of the caused direct damage whereas indirect losses are not taken into consideration. The amount of economic losses depends on scale of destructions, and the damage relates to negative influence on human health, economic areas, private houses, communication lines, areas of transport.

The costs of conducted reconstruction works on highways are measured not only based on direct consequences but also taking into account construction materials, equipment, fuels, repair of machine tools, means of labor and other factors. In some cases actual costs of needed reconstruction works may be over the planned cost table because of inflation or forced prices. In such cases the cost plan is worked out and coordinated in accordance with legislation of Azerbaijan Republic. Additional costs include also increase of the corresponding wages.

Strengthening of surface cover of lands should be managed effectively at highways which are exposed to influence of natural disasters. This concerns particularly those of mountain territories where emergence of landslide has been fixed. The problem is typical and essential also for sharp turns and steep slope of highways that must be reconstructed in order to increase security. The necessary works in such places also should include addition or enlargement of motionstrip, lighting of highways, provision of road signs in accordance with normative and technical documents, corresponding barriers of security, etc.

Conclusion

The influence of natural disasters on highways and roads in Azerbaijan may be formulated as the followings:

- Despite that some advancement has been observed by transport and non-transport sectors of the country in term of volume of road haulage, disruptions in this process negatively affect the transport sector, especially in cold season because of natural disasters. Such undesirable situation also is reflected in other economic activities as well as the social development.
- Natural disasters cause to delays and recesses in delivery of goods. Delays in their turn entail rise of cost prices of these goods.

As the carried studies show, the following proposed works are needed to be implemented in the country in order to effectively solve the problems which are related to damages on roads and highways due to natural disasters:

- Construction of roads and highways should be managed with not only taken into consideration their economic significance and efficiency but only the possible natural disasters and damages caused by them. Destructive power of natural disasters should be taken into consideration when managing reconstruction and restoration works at highways of mountainous and foothill territories;
- Particular attention should be paid on removal of underground water when constructing and exploiting of highways, i.e. hydrogeological factor.
- The complex prevention measures should be implemented at highways, bridges and other objects of motor transport in order to escape destructive influence of natural disasters and adverse environmental processes.

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