



RESEARCH ARTICLE

APPLICATION OF ANCIENT STRUCTURES IN COASTS OF RIVERS

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ABSTRACT

Rivers are started a sea (related to oceans) which are flooding in towns and inside of countries water and flows on them in rivers rout should be conducted using in develop in for living. Human making various structures in rivers coats such as dam. River wall and mills or bridges on them. Could use river flows progressing in solving some problems interacting water sources. In Shushtar, an old town in Iran, there are two rivers as two branches of Karun. Karun is divided in two branches, shotteit and Gar-Gar, in Shushtar making a structure named "Band Mizzan " so, there are several mills, bridges and walls on two sides of the rivers are Shushtar. Those structures are reconstructed and are focused for using in life and tourism. Consideration the important case in construction of those is the purpose of this research.

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INTRODUCTION

Human living on the earth using natural resources and facilities develop and solve problems. There are many rivers in Iran, such as: Karun, Arvand, Arass,.....We must optimize the availability them to whole of people who live near rivers. The most important factor considering in the case of rivers is that, don't permit to dissipate water flooding on rivers and should make structure which provide coastal destruction. In old ages ago, engineers and architects considered some hydrodynamical and hydraulical factors to optimize using rivers for living progress. We should use some of them and follow the best models for haring rivers useful and efficient in life for human. Coastal structures near the coasts of rivers could attract tourists and would be more useful than before. This research focuses on some useful factors and gives some of them since many years age until now.

Applications of the ancient structures

Human for sweeping the needs follow and progress the ways and procediers to plant and travel on different points of the earth. Rivers starting seas are good mains for these purposes. People making water ways and streams receiving water from seas and flooding water to town, villages and near to lands for planting sweep the needs. Water in the route of rivers and streams contain salts and other materials with planting benefits. People and farmers living in villages and towns set up human forces for this. Gar-Gar is a mankind rout made for separating water flooding in Karun river to get a branch of water in other places of Shushtar city.

Human in past years used Gar-Gar water for planting and drink too. Walls and "Shuushtar Bridge" were made and are recon structured to optimize the river beaches. The materials used for making the walls in coasts of Gar-Gar are rocks and Sarooj, a cement, to avoid coastal destruction. We could see a picture of walls in coast of Gar-Gar in Figure1.



Fig.1. River walls made of sarooj before Band-E-Mizzan

Band Mizzan, an important hydraulic structure

"Band-E-Mizzan" is a coastal structure made bout 400 years ago. Gar-Gar flowing in Shushtar. There are five water ways like windows to conduct water from the main route of Karun to the mankind river Gar-Gar (Figure2). These windows like water ways act so about one of third water in Karun. The Band-E-Mizzan is sinusoidal wave-shaped as shown in figure3. It emphasizes more resistance in front of eddy waves flooding on the river to weaken eddy currents and

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sweep coastal destroying as possible. In fact, people used rather strong currents of water in these water ways with small cross section and high velocity currents on them, for rolling the water mills. Curvatures on the front cross section of the coastal structure "Band-E-Mizzan" is forming two sinusoidal waves that the second wave length is one half of the first shape configuration is based on dimensions of eddies producing and happening on the eddies happenings on the river water most of time the dimensions of the 0/5 (m) and 3(m) next to and far from the structure respectively, that is, in coast and in the middle of the Shotteit in front of "Band-E-Mizzan".



Fig.2. Water ways like windows



Fig.3. Sinusoidal shape of the Band

#### Today's applications of the coastal structures in Gar-Gar

The coastal structures in the coasts Gar-Gar river are important for cultural benefits for Iran. People living in Shushtar, ancient hydraulic structures had some benefits such as:

#### Karun is conducted to Gar-Gar

2-Gar-Gar bridge in shushtar city is relation item between Bolleity zone, in north of shoushtar, and down town. Applications of these old structures are several nowadays. Importance of the structures:

- a- Tourist attraction, many foreigner tourists around of the world visit and enjoy annually.
- b- Decrease of coastline is another duty of the structures. In fact, water mills in coasts of Gar-Gar are tourism values now. We should protect and keep these valuable and cultural structures and use them more.

## RESULTS

Considering cultural and human valuables, ancient structures that were made for today needs. The following results are gained of this research about ancient structures in coasts of Gar-Gar river:

- 1- The materials used in making coastal structures are of high importance to be resistant in facing against erosion.
- 2- Reconstruction the ancient structures near water flows is important and difficult that we must do.
- 3- Preparing open and beautiful flat space around river coastal structures tourists are attracted more than age.
- 4- Constructing hydraulic coastal structures in beaches of rivers helps to
- 5- Attract tourists and sweep few requirements needed such as mills.
- 6- Streams and water way should be made getting water from river to be
- 7- Used constructing river coastal structures, we can sweep some of it.

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