

ESTEL IMPACT ON MANAGEMENT OF COASTAL WATER RESOURCES

IMPACT DE'ESTEL SUR LA GESTION DES RESSOURCES EN EAU COTIERES

Babak Aghdasi¹, Jamal Abass Palangi², Babak Momeni³ and Ghanbarali
Husseinpour⁴

ABSTRACT

ESTELS are small soil ponds, creating a soil embankment, are constructed in orchards or agricultural lands. They usually exist in lands with no water right or reliable water availability and in coastal lands with saline water. These structures through saving a considerable amount of water and feeding aquifers prevent sea water intrusion and so play a very important role in coastal water management in MAZANDARAN province. ESTELS give the farmers the opportunity to save drained water from upper lands, excess water in the form of runoff and surface water overflowed from the rivers during non-farming season and use it during the peak water demand seasons and in case of shortage. Regarding the importance of this local knowledge in managing coastal waters and agricultural benefits, allocating fund for dredging and rehabilitating them and further studies by authorities on conserving and managing them is a necessity.

Key words: ESTEL, water resources, agriculture.

RESUME

Les ESTELS sont les petits étangs du sol, créant un endiguement de terre, construits dans les vergers ou les terres agricoles. Ils existent généralement dans les régions sans le droit de l'eau ou sans la disponibilité d'eau ainsi et dans les régions côtières salines. Ces ouvrages conservent une quantité considérable de l'eau, alimentent les aquifères et empêchent l'intrusion d'eau de la mer, donc jouent un rôle important dans la gestion des eaux côtières dans la province de Mazandaran. Les ESTELS accordent aux agriculteurs l'opportunité de conserver l'eau – l'eau drainée des hautes terres, l'eau excédentaire de l'écoulement, l'eau

1 National soil & water engineering services- manager of MAZANDARAN study and supervision office

2 National soil & water engineering services- expert in MAZANDARAN study and supervision office

3 PAYAM-e NOUR university of MAHMUD ABAD tutorial instructor

4 National soil & water engineering services- expert in MAZANDARAN study and supervision office

excédentaire des rivières en dehors des saisons de culture – et de l'utiliser lors des périodes de demande accrue ou de pénurie d'eau. Il est donc nécessaire d'utiliser cette connaissance locale dans la gestion des eaux côtières pour tirer des bénéfices agricoles, d'allouer les fonds pour leur dragage et réhabilitation ainsi que pour mener des études par les autorités sur leur conservation et gestion.

Mots clés : ESTEL, ressources en eau, agriculture.

1. INTRODUCTION

Increasing population growth in the world and human's need for agricultural and livestock products and energy, lead us to make the most of each drop of water. Despite having fertile vast agricultural lands in Iran, because of farmers' lack of knowledge in optimized use of water, agriculture is still at a low level. It is necessary that the responsible authorities and organizations prepare a plan to save the considerable amount of water which flows into the sea without being used and train people how to use water more efficiently so that it resolves shortage of water and promotes economic status of the country.

In this regard water supply methods through constructing simple and inexpensive small water structures based on scientific principals might be studied and disseminated to the prospective users. Strong and effective steps could be taken in order to optimize use of water and increase the area of farm lands, leading to increased productivity.

In this respect, estels are reliable and accessible water recourses and are based on local knowledge on water recourses management in Mazandaran province. Estels can save a considerable amount of water and play an important role in saving surplus water of the streams. They give the farmers the opportunity to save drained water from upper lands, excess water in the form of runoff and surface water overflowed from the rivers during non-farming season and use it during the peak demand seasons and in case of shortage.

During the last decade, authorities and researchers have been concerned about the Ab Bandans (reservoirs) and studies were conducted on their important role during the droughts (Bagheri, 2008; Dargahi, 2007 and Boghrat et al, 2008). Presently, there are many of Ab Bandans being dredged throughout the province. In recent years farmers were confronted with water shortage, so they turned to the usage of Ab Bandans again and in some areas they constructed new ones. In the areas where sea water intrudes into the aquifers, and wells are not possible to be used due to high salinity, it is a good idea to use such structures. Although estels play a very important role in balancing water resources, sufficient attention is not being paid to them. This research is done in order to introduce Estels and study their impact on costal water resources management and giving proposals to increase their efficiency.

2. ESTELS AND THEIR DIVERSITY THROUGHOUT MAZANDARAN PROVINCE

Estels are generally available in different cities in Mazandaran province and are named differently such as Estel, Astel, Lat, Megil and Berk-E.

- In Sari they are called Estel and they can be found in villages such as Valuja, Chukola, Farahabaad, and Valiabaad.
- In Juybar they are also called Estel and can be found in villages such as Pahnab and Shahreza Mahalle.
- In Babolsar they are also called Estel and can be found in villages such as Bahnamir and Galeshkola.

In Babolsar they are mostly used as the main water resources for agricultural use due to its topography and geographical aspects. Excess surface waters which usually flow into the sea damage lands and in some cases orchards, are pumped into the Estels around and so are reliable sources of irrigation water and have a great contribution to fish raising. The number of Estels in Babolsar alone is over 2000.

- In Behshahr they are called Megil and can be found in Zaghmarz and Amirabaad.
- In Neka they are called Astel and can be found in Norouz Abaad, Baaye Kola, Dangesarak and Estaqr Posht.
- In Noue they are called Lat. They are the areas in the bed of some seasonal rivers in which water is saved and replenishes the aquifers.
- In Amol they are called Estel or Lat.
- In Chalus, Noshahr, Tonkabon and Ramsar they are also called Lat.

3. FORMATION OF ESTELS

Estels are divided into two types namely, natural and artificial. Natural Estels are formed over time. For example Rohar natural Estel (Fig. 1) located in Balabagh in Amol has an area of 1550 ha and is situated at an elevation of 2160 meters from the sea level in the southeast of Damavand summit, at north latitude of 35° 51' and east longitude of 52° 10'.



Fig. 1. Family Estel of Rohar - Amol city

Of the most important natural Estels is the Estakhrposht with an area of 8000 m² at the elevation of 665 meter from the sea level in Neka or the Kola Estel with the area of 3 ha at the elevation of 1580 meter from sea level, located 60 kilometers from Behshahr and 90 kilometer from Neka. Natural Estels in the forest area are used by livestock for drinking water.

Artificial Estels are constructed by farmers with the help of machinery on lands or orchards (usually at the entrance). During the last decades many farmers have constructed Estels in coastal regions of the Caspian Sea due to unusable saline groundwater and to fight against droughts. Figure 2 below shows a newly constructed Estel.



Fig. 2. a newly constructed ESTEL- NEKA city

A few of Estels constructed in the province like the ones used for pressurized irrigation, have operational license from Mazandaran Regional Water Company (MRWC).

4. PROPER PLACE FOR ESTEL CONSTRUCTION

It is necessary for the Estels to be located at upper site of irrigable areas. Their size is related to the required irrigation water and irrigation period. It should also be far enough from the other Estels to make sure that it can save as much surface excess water as possible. If they are close to water sources like canals, rivers and so, it makes them very important.

In general, Estel construction in the following areas is possible:

- In areas where the water is saline so that it is useless to dig wells.
- In areas with enough winter precipitation and with no water right.

- In areas which receive drained water from upper lands.
- In areas with runoff from upper lands.

4.1 Types of Estels according to ownership

1. Lands owned by group of farmers
2. National lands owned by natural resources department.
3. Lands owned by individuals

5. WATER SUPPLY SOURCES FOR ESTELS

Supply sources for Estels are surface or ground water which are not used during the year in any way and is wasted. Estels can be fed from precipitation, aquifers, drained water from upper lands and in some cases from conveyance canals and reservoirs and sometimes wells around.

6. ESTELS' ROLE IN WATER RESOURCES MANAGEMENT

The most important benefit of Estels regarding water resources management is feeding aquifers. Saving water during the non-farming seasons, Estels can feed aquifers and during the high seasons can be a good and reliable source of irrigation water to irrigate paddy fields, rain-fed lands and orchards.

Moreover Estels in coastal regions like Babolsar which are suffering from sea water intrusion into the aquifers, can play an important role in preventing intrusion by feeding aquifers and this way keep it fresh.

Estels can also create a favourable microclimatic for plants and animals.

Other applications of Estels are as follow:

- Helping in saline and alkaline soil leaching
- Using excess water for paddy fields
- Using excess water for orchards irrigation
- Using excess water for rain-fed crop irrigation (wheat, soybean and beans)
- Using the water for drinking in mountain areas
- Using as fish- raising pond
- Using as duck –raising place

7. DIFFERENCE BETWEEN ESTEL AND RESERVOIR

Estels and reservoirs are so much alike that they might be called as small reservoirs. But Estels are generally simpler than reservoirs in terms of construction technology and the way

they are fed. Unlike reservoirs that are mostly owned by a group of farmers, Estels are mainly owned by individuals.

The most important difference between reservoirs and Estels is that reservoirs are fed through pumping but Estels are gravity fed. Reservoirs have discharging pipes at their beds but Estels have no such pipes and have to be discharged through pumping. Furthermore Estels are constructed in areas with no water right but reservoirs have enough and defined water sources to warrant having water rights.

8. CONCLUSIONS

Estels play an important role in water resources management in Mazandaran province but authorities have not paid as much attention to them as they should. Proposals are given as below to maintain and optimize operation of Estels in coastal region water supplying resources:

- Recognizing Estels as traditional water structures in Mazandaran province.
- Envisaging credit line for Estels in province and national agreements.
- Creating ID for the Estels in Mazandaran province.

Despite of playing an important role in water resources management and feeding aquifers, there is unfortunately no statistics or data on the number and the annual volume of Estels and their command area. Therefore it is necessary to create ID (geographical data, size and application)

- Preliminary and possibility studies on major Estels in the province.
- Editing design technical criteria and knowledge of dredging Estels.
- Maintenance, rehabilitation and dredging Estels.

As Estels are very important saving structures, they are needed to be maintained and renovated through managerial plans or they will soon lose their efficiency and get filled by sediment as the time passes by.

For conservation and maintenance of Estels it is necessary to do the followings every 3 or 4 years, depending on their size and application:

1. Dredging sludge from the bed of Estel.
2. Rehabilitation of embankments and the bed.
3. Cleaning weeds.
4. Equipment for major Estels of Mazandaran province using geo membrane covers (except for the areas with saline ground water).

ACKNOWLEDGEMENTS

Especial thanks to Messrs Taheri, Fuladi, Kashiri, Hadinejad, Rashmanlou, Rouhi, Shakeri, Rouhollahi and Mrs. Boqrat for their guidance and cooperation

REFERENCES

- Bagheri Ali, 2008. Reservoir management and its role in saving and supplying required water for Northern agricultural lands. Second national irrigation and drainage network convention.
- BoqratTahmin-e, Amirnejad and LotfiSediq-e ,2008, studying Eastern MAZANDARAN reservoirs' role in fish raising, the first water crisis international conference.
- DargahiBijan, 2007, reservoirs as the best adapting alternative for water shortage in costal provinces of the country, the first adapting with water shortage convention.