Technology Fact Sheet

Creation of artificial cape [i]

1) **Sector:** Water resources

2) **Subsector:** Sea coastal zone

3) **Technology Name:** Creation of artificial cape

4) **Option name:** Creation of artificial cape

5) **Scale:** The replication and spreading of this technology is possible for any type of seashore, where the underwater flow along the coast of solid inert material exists.

6) **Availability:** The technology is available and, combined with the arrangement of artificial swell and construction of dikes it represents one of the most effective and relatively inexpensive ways to mitigate the coastline washing off and to adapt to eustazy.

7) **Background/notes (short description of the technology option)**

The artificial cape creation method for the protection of coastline is widely applied in many countries. It is successfully used in Georgia as well. One of the outstanding and succeeded examples of artificial cape is the artificial prolongation of the Buruntabie promontory, which contributed to the formation, increase and stabilization of contemporary Batumi beach.In general, the Georgian coastline is notable with the variety of natural capes, created by the solid sediment of rivers. For the last 5 thousand years the alluvion of large rivers (Mzimta, Psow, Bzipi, Gumista, Kodori, Enguri, Rioni, Chorokhi) has formed geomorphological incrustations (capes), most prominent of which (Bichvinta, Sokhumi, Buruntabie) had protected coastal areas at some kilometers from the dominant westerly rough sea. At the same time, the weaker easterly roughness created so called diffusion zones. The configuration of capes depends on many factors, most important of which are the exposition of the coast and the coarseness of solid material forming the promontory.With the formation of artificial capes in the coastal zone the same processes are stimulated, that are typical for natural promontories. Therefore it represents one of effective technologies in combination with the arrangement of underwater wave-breakers, coastal swells and dikes for the adaptation of coastal zone to climate change.In Georgia's conditions the construction of artificial capes could be performed in most cases right to the river outflow by two ways:# Artificial cape can be constructed using both concrete and broken stones, or other proper material;

1. Cape can be built with so called "by-passing" method, using the transport of sand by pipeline, hydraulic dredger and hopper-barges.

The artificially created cape holds up as much as possible inert material transported form the north by sea currents and promotes the restoration of entire profile of underwater and land parts of the beach. By this way the natural beach is being created between the capes, that provides the shading down of aggressive waves and stabilization of the coast.

Advantages of technology:
* The unique character and preference of the method consists of its ability to facilitate the local preservation of the beach, it represents inexpensive technology and keeps the seashore landscape in its natural state.

- Artificial capes and correspondingly the presence of primordial beaches at the coast provide natural habitat for many kinds of flora and fauna, among them for that included in the Red Book (e.g. *Pancratium maritimum),* which deserve much attention and care.

Hence the creation of artificial capes could be regarded as an important technology to provide the solution of both environmental and recreational problems.

The negative feature of offered technology is the prevention of sediment transfer to the south and consequent degradation of beach there. However, this problem in the short run could be solved by artificial dumping of inert material at the southern section of selected area, and in the long run it could be solved by natural overfilling of beach by alluvion north to the cape and following refilling of southern section of the beach. Approximately the same is technology based upon the construction of artificial boons. However, contrary to them, promontories do not deteriorate the natural landscapes. The artificial cape technology is used only in cases where the underwater flow of alluvion exists.

8) Implementation assumptions (how the technology will be implemented and diffused across the sub-sector)

The proposed technology could be adopted in places endangered by the local degradation of beaches, sea-level rise and the consequent submergence of low-laying neighbouring territories. The technology promotes the effective dissipation of wave energy and the removal of coastal slope profile inland at the rate of sea-level rise 3-5 mm/yr. It could be applied for the provision of safe construction and maintenance of coastal recreation and other types of utilities.

The Black Sea coastal section at the village of Anaklia, located in the northernmost part of the Kolkheti Lowland, represents a technologically damaged area, the natural development of which has been disturbed by the transfer of R. Enguri into the river of Eristskali and by the construction of Enguri HPP giant dam. From 1970-es this anthropogenic interference has stipulated the intensive washing off of beaches in the Anaklia area, being in progress at present. As a result of this process the beach washing off rate from the former mouth of R.

Enguri to the outfall of R. Tikori makes about 10m per annum. According to the Georgian government decision at present the free tourism zone is being created here, featured by the construction of multi-storey hotels and other tourism infrastructure. Hence, the adoption of above mentioned technology at the Anaklia seashore would provide the formation of stable natural beaches and, therefore, the preservation of existing there recreational, tourist and other facilities, and natural wetlands as well. At the same time, in case of beach degradation and wiping out, a sufficiently large area of land could be lost in the recreation zone, that is economically impermissible for Georgia with its shortage of land. The proposed technology represents a measure for preventing the running on scenario in this direction. The artificial cape can be occupied by the recreational, signal (lighthouse) or public catering utilities.

9) Impact statements

- **Social development priorities:** The introduction of offered technology will make a definite share to the promotion of recreation and tourism industry in Georgia.

- **Economic development priorities:** The technology is important for the development of such priority sectors of economy as the tourism and transportation. The adaptation of this technology will facilitate the development of recreation, travelling and transport infrastructure. In particular, the erection of buildings at 4.1 km long coastline in Anaklia is planned including multi-storey hotels, modern aquapark, bars and restaurants, sporting complexes, the tourist-recreational infrastructure, natural park, sea-water lagoon park, modern motor-highways, rapid communication with the Poti Airport, buildings of hospital and the police headquarters. Stating briefly:
  * The creation of a new sea-resort is planned;
    - The construction of a highway along the seashore is planned;
    - The building of a sea-port is planned at the land, which could become an important strategic economic facility.

- **Environmental development priorities:** The offered technology plays an important role in the protection of natural wetlands, as they are being threatened by the eustazy and increasingly intensified storm surges. The presence of natural beaches is recognized as one of effective factors for the preservation of recreation facilities and wetlands. The beaches also represent natural habitat for many species of flora and fauna, hence its rehabilitation technology is valuable from the environmental standpoint as well. The construction of artificial capes just creates an efficient opportunity for the conservation of natural beaches. The beaches and capes also represent natural habitat for many species of flora and fauna, hence their rehabilitation technology is important from the environmental standpoint as well.

- **Other factors:**
  1. Availability of inert material;
  2. Problems concerning financial and coastal management.

10) Costs (US$)

- **Capital costs over 10 years:** The dumping of 1m3 of inert material for the rehabilitation of the beach at 2007 prices costed about 7-10 USD, depending on the distance from a sand-pit, and on the mining and transportation technology. It should

be specified after scoping and designing the project. All in all, the construction of 150-300m long artificial cape could cost about 1,5-2 million USD.

- **Operational and maintenance costs over 10 years:** The maintenance expenses for 1 cape could be assessed in the range of 10-30 thousand USD.

- **Other costs over 10 years:** Regular topographical survey and geomorphological examination will cost about 50-100 thousand USD.

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[i] **This fact sheet has been extracted from TNA Report - Adaptation for Georgia. You can access the complete report from the TNA project website http://tech-action.org/**