Technology Fact Sheet

Artificial piling of inert material[i]

1) **Sector:** Water resources

2) **Subsector:** Sea coastal zone

3) **Technology Name:** Artificial piling of inert material

4) **Recommended option of technology:** Artificial piling of inert material

5) **Scale:** The replication and spreading of this technology is possible for any type of seashore, but the effect would be rather perceptible in case of sandy beaches.

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 way to mitigate the coastline washing away and to adapt to eustazy.

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

The method of dumping inert material for the protection of coastline is widely applied in many countries. It has been adopted at the operational scale in 1980-es in Georgia during the conduction of coast-protection works by the specialized organization "Saknapirdatsva" (V. Zenkovich, A. Kiknadze) at the Adjara and Abkhazia seashore. Later on this method has been used in Russia, USA, the Netherlands, Australia and many other countries.The heaping of inert material could be performed using dump-trucks, carrying inert material from outside sand-pits, or by the "By-passing" method using dredgers and hopper-barges, piling material at the depth of 3-7 meters.Resulting from the wave dynamical impact the piles of inert material are being redistributed and the complete profile of underwater and land parts of the beach is being restored. Hence, the natural beach is being created, providing the fading of aggressive waves and stabilization of the coast.

Advantages of technology: The method does not destroy natural processes developing for many years; it represents relatively inexpensive technology and provides keeping specific landscapes, typical for the selected part of the seashore.

- Contrary to other technologies (boons, piers, port breakwaters, etc.) it does not impede the development of adjacent parts of the coastline.
- Artificial heaping and corresponding existence of primordial beaches at the coast provide natural environment, necessary for many kinds of flora and fauna, among them for that included in the Red Book (e.g. *Pancratium maritimum).*

Therefore, the artificial pilings could be considered as valuable technology from both the ecological/environmental and recreational points of view. Approximately the same is the technology for arrangement the artificial beaches. However, the heaping could be applied everywhere, while the artificial beach technology is used only in cases when due to the great deficit of alluvium the formation of beach is impossible.

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

The technology could be adopted in cases where there is a danger of beach degradation, or submerging of low-laying territories resulting from the sea-level rise. The technology promotes the effective suppression of waves and the removal of coastal slope profile inside the land 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 recreational and other types of facilities.

Before piling of inert material

After piling of inert material

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 b 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.

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 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.

- **Other factors:**

  - Availability of inert material; Presence of existing capital buildings and private property at the technology adoption place, 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 piling of 3-4 km section of seashore could cost 20-30 million USD.

- **Operational and maintenance costs over 10 years:** The maintenance cost of 1km of shoreline varies in the range of 30-100 thousand USD.

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

---

[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/**