Technology Fact Sheet

Surface Self-flow with mechanical uplifting of water[i]

1) **Sector:** Agriculture

2) **Subsector:** Irrigation

3) **Technology Name:** Surface self-flow with mechanical uplifting of water. This technology is the same as the surface gravity flow, but in this case the flow of water is created with uplifting water at some elevation by means of pumps. In Kakheti predominantly the row irrigation is recommended.

4) **Option Name:** Irrigation of arable lands.

5) **Scale:** Mainly territories south to the Alazani Kvemo (Lower) irrigation systems and eminent slopes adjusting the Samgori Zemo (Upper) main canal (R. Iori basin).Kakheti region (East Georgia).

6) **Availability:** Technology is available and is one of the efficient and cheapest ways to irrigate arable territories. This is traditional for Georgia and for this region.

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

   This method is most widely used when the flow of water is conditioned by the natural inclination of relief. The command mark is located above the irrigated territory. Any irrigation system must have the headwork – hydrotechnical construction allowing the distribution and water take-off from the system. It is built at the head of derivation or main canals. The headwork provides the constant supply and regulation of water flow in the system. The technology is mostly used in case of relatively soft and uniform relief, with inclination in the range of 0,001 – 0,03; With large (>800-1000m3/ha) norms of irrigation; To wash down salts from saline and alkali soils; In areas with strong winds. There are 3 types of irrigation technologies: by rows, by the free flow and by filling to overflow. The row irrigation is used for choppered crops. According to the inclination of slope and properties of soil the rows could be through or shut-off, short (60-80m) or long (450-500m). One row can pass through 0,1-3,0 l/min and more amount of water. When designing the ground canals, it is important to select flow velocities preventing washing out of the canal bed or, on the contrary, sedimentation of suspended particles.

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

   Territory with relatively soft (inclination in the range of 0,02-0,03) and inform relief around the command height, supplied by mechanical uplifting of water. Territory south to the Alazani Kvemo irrigation system and in R. Iori basin – elevated slopes neighboring the Samgori Zemo main canal. For the inclination less than 0,002 the irrigation by filling deep closed rows without derivation is recommended, while for inclination more than 0,002 – by deep rows with derivation.

9) Impact statements

- **Country social development priorities:** Employment of local population, holding up of migration processes, improving of living standards of residents.

- **Country economic development priorities:** Agriculture is one of the priorities of Government and particularly in the east Georgia. Increase of harvest by 2-3 times, improvement of soil properties, raise in soil productivity.

- **Country environmental development priorities:** Prevention of soil degradation (marshing, salination, erosion).

- **Other consideration and priorities such as market potential:** The absence of data for optimizing the irrigation network and determining the optimal flow velocities in canals; Absence of orthogonal photographs and recent data on land inventory and land-use. The impossibility to rapier the canals with efforts of local population. The irrigation network is to be cleaned (the cleaning of Alazani upper and lower main canals costs about 350-400 thousand Lari). The draining system is to be arranged by drilling the vertical wells (drilling of about 3 hundred 5-meter deep wells costs about 150 000 Lari). In the first place these works have to be undertaken in Sighnakhi and Dedoplistskaro districts. The skilled irrigators must be prepared to provide optimal use of water from irrigation systems. Irrigated lands are to be classified according to irrigation technologies and machinery, and relevant recommendations must be worked out.

  Accounting and specification of underground water stockpiles and operational resources, determination of the number of functioning and closed down wells to include the Alazani-Agrichai artesian basin into the irrigation network of R. Alazani southern section. Arrangement of energy supply for pumping station.

10) Costs (US$)

- **Capital costs over 10 years:** Capital (main) expenses for 10 year period – Medium-size headwork (3 million Lari); Construction of 1m concrete canal (100-200 Lari); Laying of 1m ground canal (30-50 Lari); Rehabilitation of 1 ha (1700-2500 Lari); Drilling of 1m draining vertical well (100-120 Lari); Pumping unit (300 l/s uplift at 300m elevation – 100 000 Lari).

- **Operational and maintenance costs over 10 years:** Cleaning of 1m canal (2-3 Lari); Cleaning of 1m3 of river beds (1 Lari). Annual monitoring and expert examination (2500-3000 Lari).

- **Other costs over 10 years:** N/A

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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/**