ABSTRACT

The PhD thesis entitled "Researches on the impact assessment of the environment produced by the small hydroelectric power plants arranged on rivers from Suceava county" is structured in two parts, respectively 7 chapters.

The first part entitled "The current stage of knowledge" was theoretically grounded by consulting the representative bibliographic sources and comprises 52 pages, representing 32.91% of the volume of the thesis. The information was synthesized in 2 chapters.

The first chapter refers to the importance of water worldwide; the current availability of fresh water resources; water use; development of hydropower at global, European and national level; the potential and rate of use of hydropower in European countries, the impact of hydropower developments on the environment and, respectively,

Thereby it can be seen that in small cases small power hydroelectric power plants have been located in isolated rural areas in order to supply electricity. Global electricity production increases about 3.4%, although about 1.2 billion people do not have access to electricity.

At European and national level policies are implemented that support and encourage the production of renewable electricity, thus the sector of low power hydroelectric power plants has been remarkable. This was possible due to the fact that in the case of large hydroelectric power stations, environmental degradation was observed, mainly due to water barrage.

The second chapter presents the description of the natural framework in the area where the scientific researches were carried out.

Part II includes the "Contributions of the author", presented on 106 pages, representing 67.09% of the paper, and includes 5 chapters in which are presented the purpose and objectives of the research, the working methods used for the study of river basins, the assessment of the behavior in the exploitation of the riverside river works in Suceava County, the evaluation of the technical and economic efficiency of the hydro-energetic facilities studied and the impact on the environmental components.

The work sums up 51 figures and 41 tables, and 106 bibliographic references have been consulted.

The objectives of the PhD thesis were the study of the riverbed development works in the river basins of the Bistrita, Moldova and Suceava rivers; the identification and characterization of low-power hydroelectric power

plants executed on the tributaries of these watercourses and the appreciation of their functionality as well as the effect of economic activities on natural capital.

Chapter 4 presents the morphometric particularities of the studied hydrographic basins and the characteristics of the works executed in the alluvial basins of the rivers Moldova and Suceava.

Under the surface aspect, the largest is the river basin of the Moldova river (2575 km^2), followed by the Bistrita catchment area - 2532 km^2 and the Suceava basin of 2276 km^2.

Regarding the length of the receiving basins, Suceava basin is the longest (142.3 km) followed by CA Moldova (115.1 km) and CA Bistriţa (88.5 km).

The average widths of the river basins studied have values between 15,99 km (CA Suceava) and 28,61 km (CA Bistriţa), CA Moldova with a value of 22,37 km, approaching the average value of the three CA.

It is noteworthy that the river basin of the Bistrita river is predisposed to the formation of floods due to the lowest value of the coefficient of development of the water catchment (1,79). In the case of the receiving basins of rivers Moldova and Suceava, they have values of 2.01 and 2.19.

In order to prevent floods in Suceava county, 31 embankments were performed on a distance of 76.07 km, the average length being 2.45 km.

In order to consolidate the shores, there were performed 35 shore defense works on a length of 24.64 km and 34 adjustment works with a length of 138.41 km and an average length of 4.07 km.

The necessity of regularizing the flows and the mitigation of the flood wave implied 8 barrages of the Siret, Suceava, Solca, Dragomirna, Hatnuţa, Horait and Somuzul Mare rivers. The largest accumulation is Rogojesti, which accumulates about 60% of the total volume accumulated by the 8 dams. In addition to their main function, dams also perform additional flow or water supply functions.

Chapter five deals with the issue of low-power hydroelectric power plants located in the river basins of the Bistrita, Moldavian and Suceava rivers. The structure of the works and of the component elements was analyzed and similarities of the component elements (capture, compensating basin, forced duct, escape channel or exhaust pipes) were found. However, there are differences in the shape of the elements and their dimensions. For example, in the Pojorata settlement, there is only one capture with the opening of 60 m, in the case of the other facilities, there are two catches (main and secondary), the smallest one having the width of 12 m.

From the point of view of the water intakes, two types are distinguished, namely the lateral sockets (Pojorata) and tyrolean sockets, the lattes being much more difficult to manage.

The forebay tank basins of analyzed plants have the shape of a rectangular and trapezoidal section and a potential for accumulation of 14,500 m^3 of water. The Pojorata plant has the capacity to retain 62% of the total capacity of the five compensating basins, with the lowest accumulation potential of 400 m^3 (Sihastrie).

In terms of the length of the forced pipelines, they amount to 21.17 km in length and their diameter varies between 800 mm (Sihastrie center) and 2.000 mm (Pojorata center)

The evacuation of the volumes of water used for the production of electric power is achieved by means of the trapezoidal runways of different lengths (50 - 65 m), which are located downstream of the tranquility chamber. The Vorova and Sihastrie hydroelectric power stations have evacuated ducts with a 1,000 mm pipe diameter.

In chapter six are presented data referring to the analysis of the operational behavior of the plants and the limiting factors in the production of electricity. Also, the effect of the plants on the environmental components was also analyzed.

From the point of view of the energy produced annually and the operating hours, the following can be formulated:

- SHP Darmmoxa, produces 1770 MWh / year and operates 8827 hours;
- SHP Sihastrie, produces 1028 MWh / year and operates 8616 hours;
- SHP Vorova, produces 745 MWh / year and operates 5062 hours;
- SHP Dornisoara, produces 3745 MWh / year and operates 6654 hours;
- SHP Pojorata, produces 770 MWh / year and operates 6852.

A major problem in the production of electricity is massive deforestation that has taken place over the past decades and soil erosion in hydroelectric power plant receiving basins.

The construction elements of the plants affected by clogging are:

- the forebay tank that require the removal of the clogging one time a year;

- the intake, requires unclogging works about three times a year, the most affected are the facilities in CA Bistrita.

Thus it is estimated that the losses caused by erosion and deforestation are about 23 MWh / year due to the clogging of the power plants for mechanical removal works. In addition to the electricity losses, costs of approximately 32,000 lei are required for decoupling forebay tank and intakes. Due to the large

quantity of suspension in the water used for the production of electric power as well as the repeated unglogging carried out in the compensatory basins, respectively, they increase the wear of the hydrotechnical constructions and of the technical equipment (forced duct, turbines).

Regarding the environmental impact produced by the low-power hydroelectric power plants on the rivers in Suceava county, the effects they have can be classified according to several criteria:

a) functional effects resulting from the purpose of the hydro-energetic facilities:

- regulating the natural water flows in the catch-evacuation section;
- flood protection for SHP with large compensation basins;
- converting hydraulic power into other forms of energy;

b) ecological effects, which refer to direct or indirect actions on animals, plants or animals, considered individually, but especially as species. In the analyzed facilities their ecological effect is limited to the decrease of the flow rates between the capture and evacuation sections, the modification of the sand morphology in the case of the settlements located on low-flow rivers as well as the minor differences upstream and downstream of the threshold catchments.

c) economic and social effects, these include the consequences of the hydroenergetic arrangements on the anthropic environment, the change of the destination and the quality of the land with effective economic value.

In order to highlight the impact of hydropower plants within the river basins of the Bistrita and Moldavian rivers, an analysis of 6 environmental parameters, which suffer or may undergo changes to their natural state, has been carried out. The analysis was carried out on the following parameters: habitat deterioration; passages for fauna; waste; emissions; noise and vibration produced by hydro-aggregates and visual pollution.

In this respect, it was found that the rational location and responsible operation of the person did not cause significant adverse effects to the environment.

In order to increase the quality of life in isolated rural communities, SHP are recommended for: the provision of electricity, the support and development of the local economy and the creation of new jobs.