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The Ecological Control over Productivity Parameters of Some River Basins of Azerbaijan

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Abstract

The presented work is about ecological control over productivity parameters of soils. In the paper the chance of soil productivity parameters was studied in some basins of Azerbaijan rivers, in former 40-50 years, specifically on alternation of humus content, common nitrogen and medium reaction. It was revealed that in the former period degradation of some parameters of the productivity happened under the influence of antropogenic and environmental factors.

Keywords

Ecological Control, Monitoring, Productivity Parameters, River Basins

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1. Introduction

Since second half of 20th century, the environmental protection problem from anthropogenic influences became one of the major questions in various countries, including Azerbaijan. In our republic the great attention is especially paid to biosphere protection and rational wildlife management questions at last decade. However, without the objective information on an actual changes happening in biosphere, it is impossible to practice nature protection actions. Therefore special controlling systems, natural and environmental estimations and monitoring should be realized. As mentioned in “Man and Biosphere” international Program of UNESCO, monitoring is long and continuous supervision system which gives people the information on significant changes on periodical environmental processes from past till the present and future. Ecological monitoring distinguishes the requirement by estimating and forecasting about the ecosystem state in order to compare the differences between several subsystems on the Earth [1, 2].

To our decision, ecological monitoring on the ground is especially important now. Indeed, there are enough items on controlling systems for atmosphere, sea water, soil safety which can track pollution rate in any case. Actually soil accumulates all wastes after the pollution, finally changes occur in biosphere. The soil cover has major importance in food supply, natural location and settlement of the people. Atmospheric air purity, underground waters cleanness depend on chemical and biochemical processes in the soil which present in soil properties. In agricultural production intensification and industry development conditions the soil cover frequently undergo the strongest irreversible changes. Unreasoned anthropogenic influence on natural ecological balance of soils. Humus mineralization acidity or alkalinitydity raise, salts accumulation develops and reduction of necessary fertility properties and sometimes results full destruction of soil structure [3].

The basic functions of soil monitoring are: the account of losses in ground water, wind and irrigational erosion; revealing of negative humus balance and the basic nutritious elements in territories; the control on soil acidity and alkalinity; salt, water and thermal modes; revealing of pollution by heavy metals, pesticides and household waste products; the control of the changes occurring in ground under influence of anthropogenic activity, and also the organization of inspection service. The service for soil monitoring firstly

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gives economic advantage, except for soil protection maintenance. It can play the important role in preparation of forecasts for realization ameliorative and others measurements on soil properties improvement [4]. It is very important to take into account that it is much easier to prevent negative processes in ground than to liquidate their consequences.

In Azerbaijan ecological monitoring of soil in connection with above-stated is of great importance. For the first time researches on ecological soil monitoring in our republic were carried out by G.S.Mamedov [5, 6]. It has been continued in the given area by Mamedova, Jafarov, Shabanov [7, 8,10,11].

2. Materials and Methods

As object of research we chose pools of some rivers of Azerbaijan, namely: pools of the biggest river in Lenkoran areas – Lenkoranchay and proceeding on a northeast slope of the Great Caucasus rivers Gudyalchay and Garachay. The area of catchment basin Lenkoranchay makes 104000 ha, Gudiyalchay basin consists of 79900 ha, Garachay basin is about 41700 ha.

During research pool-type method was used in the territory where requirements of monitoring has great before other territorial units, namely borders definition, substance stream and energy, scales of similar pools structure were defined. In Azerbaijan during soil studies for the first time this method was applied by Mammadov [9].

Chemical analyses were carried out on the existing techniques: the obtained results were compared with known on the past of researches carried out 40-years ago at the Institute of Soil Science and Agrochemistry.

3. Results and Discussion

We carried out research for a long time by monitoring soil on the pools of Azerbaijan rivers. As the result deterioration on some parameters of soil fertility was revealed. So, the major fertility parameter on the ground, humus has appreciably decreased. Researches show that Lenkoran river basin had chestnut mountain soil 40-50 years ago, humus stocks in soil layer consisted of 174 t/ha, which reduced in amount. This parameter has decreased and makes 134 t/ha. Accordingly humus and other important parameters have worsened, too. The quantity of total nitrogen in the soils content in a layer 0-100 cm reduces. According to all available information nitrogen has decreased on 25%. There were some changes in environmental reaction parameters. Water suspension has raised to 7.5 up to 8.2. It is obvious, that reaction of soil solution have changed with slightly alkaline up to alkaline. In mountain - wood zheltozem of the same territory humus stocks have decreased on 15. It is connected to significant reduction of the woods area. On the data 1953-1956 40-50 years ago woods had 59000 ha square, and according to all available information that is the area under woods has decreased about 30 %. The similar phenomena are observed in pools of the rivers Gudyalchay and Garachay. So, in the mountain - meadow turfy soil pool of the rivers Gudyalchay on the last data (1957-1960) humus maintenance in a layer 0-100 cm was 2,92 %, now this parameter has decreased on 19 % and makes 2,36 %. Approximately much percentage humus stocks have decreased: with 350 up to 284ò/ãà. The maintenance of nitrogen has changed from 0,21 % in the past up to 0,18 % in the present, stocks of total nitrogen has decreased on the average on 4 t/ha (with 25 up to 21t/ha) on 16 %. Reaction of environment has increased with 5,9 up to 6.5, coming nearer to neutral.

About brown mountain - wood soils on Garachay river basin stocks гумуса in a layer 0-100cm made in 1957-1960 years. 279t/ha, in present time (2006-2010) this parameter has decreased on 26 % and makes 205t/ha. The quantity of total nitrogen in a meter layer also has decreased: from 0,18 % in the past up to 0.14 % in the present; stocks of total nitrogen have decreased on the average on 5t/ha (23 %). If earlier value pH water suspension on the average made 6,3 has now raised up to 7,2 that is reaction of a soil solution has changed with sub acidic up to neutral or slightly alkaline. In mountain - wood brown soil the humus maintenance in a layer 0-100 cm earlier on the average was 2,05 % on the modern data is 1,47 %. Humus stocks in a layer 0-100 cm in the past was 270t/ha, now it has gone down till 194t/ha, that is averagely 28 %. The maintenance of total nitrogen in them has gone down in comparison with the past on the average on 25 %. Reaction of a soil solution also has a little changed aside alkalinity: with 6,8 up to 7,4, sometimes up to 8,0 in the bottom horizons. To these changes promoted, probably, some increase of the maintenance hydrolytic alkaline salts and increase arid climate causes steppe formation as a result of woods cutting. Change of some parameters of soil fertility has been specified in the below at the mentioned table.

Table 1. Parameters changing of soil fertility in the research area.

Parameters of soil fertility	Lankaranchay			Gudyalchay			Garachay		
	Mountain chestnut			mountain-meadow turfy			Mountain-forest brown		
	1953-1956	1994-2004	Difference	1957-1960	2006-2010	Difference	1957-1960	2006-2010	Difference
Humus content, %	1,28	0,99	-0,29	2,92	2,36	-0,56	2,3	1,69	-0,61
Humus reserve, t/ha	174	134	-40	350	284	-66	279	205	-74

Parameters of soil fertility	Lankaranchay			Gudyalchay			Garachay		
	Mountain chestnut			mountain-meadow turfy			Mountain-forest brown		
	1953-1956	1994-2004	Difference	1957-1960	2006-2010	Difference	1957-1960	2006-2010	Difference
Common nitrogen, %	0,12	0,09	-0,03	0,21	0,18	-0,03	0,18	0,14	-0,04
Common nitrogen reserve, t/ha	16	12	-4	25	21	-4	22	17	5
pH (water suspension)	7,5	8,2	+0,7	5,9	6,5	+0,6	6,3	7,2	+0,9

4. Conclusion

It is obvious, that parameters of fertility basins, research territories have changed under influence of anthropogenic factors. As a result of cutting down of woods, abnormal cattle grazing led to these conclusion. Erosive processes have increased in relief under an agricultural production, has taken place partial stepped places on the woodless areas therefore the wood vegetation has changed steppe formations and the water mode has changed, humus stocks, total nitrogen have decreased. According to this, others have changed also important soil fertility indexes. For prevention of negative consequences of reduction of soil fertility it is necessary to protect and improve all measures used ground, the special attention needs to be given preservation and woods recovery. First of all, grazing norms are to be exacted for cattle, and there where the soil cover is considerably broken, completely to forbid the soils from being degraded, turf forming grasses and plants are sew on the given areas before full restoration of vegetative and soil covers.

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