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DEGRADED SOILS: A RESOURCE FOR PROVIDING ORGANIC NUTRITION TO SOCIALLY VULNERABLE SEGMENTS OF THE POPULATION, MOTIVATION FARMERS TO USE ENVIRONMENTALLY FRIENDLY TECHNOLOGIES

Research article

Abstract

The problems of providing socially unprotected citizens with environmentally friendly food through the use of degraded soils as a resource are considered. The method of social surveys showed that poverty in the agricultural sector creates socio-cultural conditions for the reproduction of poverty as a phenomenon, a tendency to the destruction of fertility. Measures of the state support of producers and processors of agricultural products are offered. It is proposed to motivate farmers to use environmentally friendly soil-saving technologies with the tools of state support

Keywords: Soil degradation, soil protection technologies, government support, food aid, poverty, WTO.

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ДЕГРАДИРОВАННЫЕ ПОЧВЫ: РЕСУРС ДЛЯ ОБЕСПЕЧЕНИЯ ОРГАНИЧЕСКИМ ПИТАНИЕМ СОЦИАЛЬНО УЯЗВИМЫХ СЛОЕВ НАСЕЛЕНИЯ, МОТИВАЦИЯ ФЕРМЕРОВ К ИСПОЛЬЗОВАНИЮ ЭКОЛОГИЧЕСКИ ЧИСТЫХ ТЕХНОЛОГИЙ

Научная статья

Аннотация

Рассмотрены проблемы обеспечения социально незащищенных граждан экологически чистым питанием за счет использования деградированных почв в качестве ресурса. Метод социальных обследований показал, что бедность в аграрном секторе создает социокультурные предпосылки для воспроизводства бедности как явления, склонности к разрушению плодородия. Предложены меры государственной поддержки производителей и переработчиков сельскохозяйственной продукции. Предлагается инструментами господдержки мотивировать фермеров к использованию экологически чистых почвосберегающих технологий.

Ключевые слова: Деградация почв, технологии защиты почв, государственная поддержка, продовольственная помощь, бедность, ВТО.

1. Introduction

The solution of the problem of providing the population with healthy food on a global scale is taking place in the conditions of the growing process of soil degradation. According to the FAO "... about 33% of global soil resources are degraded due to erosion, compaction and salinization, leaching of organic and nutrient substances, acidification, pollution and other processes associated with unstable land management practices ..." D. Montgomery, (2015), [2 p. 7]. The international community within the framework of the World Trade Organization has created mechanisms of interaction in the field of food trade through the creation of rules of market behavior. Due to the special social and political importance, the problem of healthy nutrition of

pregnant and lactating women, children, schoolchildren, clients of social institutions nationwide is in the state responsibility zone. The state, by methods of regulation, has the opportunity, within the framework of the WTO green box, to motivate the use of soils that are not suitable for active exploitation, for organic farming, for obtaining environmentally friendly products. This approach has become economically viable for Russia and other countries with a transforming economy that joined the WTO. Instruments of state support can create a mechanism for helping farmers who produce on degraded soils. Often, because of poverty, farmers who produce on a household scale are themselves in need of food assistance.

Objective: to justify measures to use degraded soils as a resource for agriculture, which provides healthy food for the needy population. Instruments of state support in the framework of the WTO Green Box, motivate farmers to preserve soil fertility.

On a world scale, there is a need that has high political and social relevance, to produce for the needy population segments foodstuffs obtained in environmentally friendly conditions. The category of socially unprotected, as noted above, includes pregnant and lactating women, children, schoolchildren, clients of social institutions, etc., providing healthy food, finding land resources where it is possible to organize the production of environmentally friendly food, without the use of pesticides with limited quantity of fertilizers. There is an urgent need to conserve soils to ensure food security and the sustainability of the future of mankind. This is especially important under the current conditions, when in the world more than 805 million people face hunger and malnutrition. Population growth over the next 35 years will require an increase in food production by about 60% [FAO, 2015 p. 196].

D. Montgomery said the need to reverse the trend of soil degradation, as one of the most undervalued environmental crises of our time. If new approaches are not introduced, the total area of arable and fertile land per capita, according to the above source, will be only one quarter of the 1960 level in 2050 ... "D. Montgomery, 2015, [2 p. 7].

The production of food depends largely on the fertility of soils, so it is important that they are healthy and productive. This determines the importance of the return to productive turnover of lands subject to depletion associated with economic activity of economic entities, as well as under the influence of natural phenomena, wind and water erosion, which is typical for many countries and regions (China, Australia, Kazakhstan, Ukraine, in Russia – Volga region, Siberia, Caucasus, etc.).

There are necessary grounds to draw a conclusion about the urgency of the problem of food supply to the needy population, protection and restoration of natural factors of production through the introduction of organic farming technologies and the production of environmentally friendly products.

2. Literature Review

Land resources and their condition, the problems of poverty and hunger alleviation are among the priorities of the world social and economic science. In Russia, the issue of adequate nutrition in general and for the younger generation, in particular, is considered in the context of the health of the nation. In recent decades, large-scale scientific research has been carried out within the framework of the Food and Agriculture Organization of the United Nations (FAO), which confirms the high scientific and practical importance of social protection of the population, the protection of natural factors, and the behavioral responses of the needy population to measures implemented by the state. The FAO report "The State of the World's Land and Water Resources for Food and Agriculture" contains the first ever global assessment of the state of land resources on the planet. FAO Director-General Jacques said "The report emphasizes that the complex impact of all factors and the resulting agricultural transformation threaten some production systems with loss of integration and production capacity. Such systems will not be able to contribute, as previously thought, to meeting the needs of the world's population by 2050. Effects in terms of hunger and poverty alleviation will be unacceptable. Restorative measures must be taken now"[4].

Based on the report, a picture of the world is emerging, experiencing a growing imbalance between the availability and demand for land and water resources at the local and national level. The number of areas that have almost exhausted potential of their productive capacity is rapidly increasing, according to the report 25% of the world's land is degraded. The definition of FAO of the degradation degree extends not only to soil and water, but includes other aspects of damaged ecosystems, such as loss of biodiversity.

The report "The State of the World's Land and Water Resources for Food and Agriculture" (SWLWR) notes that while in the last 50 years there has been a significant increase in food production, in many cases, such achievements have been associated with management practices that led to degradation of land and water systems on which food production depends. [5]

Concerning Russian conditions, domestic and foreign literature sources provide a sufficient idea of the genesis processes in the field of agricultural land use. First of all, loss of soil fertility associated with irrational land management. A team of scientists of the Russian Academy of Agricultural Sciences (RAAS) has prepared a report in which, on the basis of official sources, it is reported that "at the beginning of 2008, 30 to 40 million hectares of arable land in Russia were taken out of turnover and are not used (G.A. Romanenko , 2008) [1, page 66].

In the context of transformations in the post-socialist countries of the ownership forms of land as a result of denationalization and privatization, decision-making in the application of technology was transferred from large state enterprises to a large number of entities that received land plots. According to the authors of Camboni, Sylvania M., Ted J. Napier. 1992, Hooks, Gregory M., et al, (1987) [7, p. 112], [2, p. 309] the decisions in agriculture are influenced by macro-social factors (beyond the control of the business executive, demographic situation); micro-social factors (poverty, desire of the farmer to make a profit in the short run, concern about their survival); state policy.

3. Methods

The methodology is aimed at identifying the patterns and relationships that affect the specific actions of workers on the application of zonal systems of farming at the level of an individual enterprise. Determination of the directions of activity of newly created economic entities, the identification of the conditions under which the activities of newly created enterprises will

be in line with creative goals are to be relevant. This presupposes the existence of factors that go beyond self-survival, i.e. only under certain conditions it is possible to solve major long-term development tasks and, above all, to preserve the environment as the main condition for agricultural production.

The geographic area for our social research was the regions that are extensive for the territory of Russia, the so-called arid farming zone: Siberia, the Volga region, the Altai Territory, the border territories of Northern and Central Kazakhstan.

The survey was carried out in two periods: (1992-1998) - 247 land-uses were surveyed and in 2002-2008 93 farms of various forms of ownership were surveyed, which received as a result of denationalization of land plots. The total area of cultivated land in the surveyed farms was about 1.8 million hectares.

The central core of the study was the collection of primary sociological information. Primary information is obtained by addressing questions to a group of people who are related to technologies in agriculture or as a business entity (managers, specialists, machine operators) or scientists.

In carrying out a survey researchers were interested in the subjective side of the matter, i.e. how certain objective processes are perceived in people's minds. Based on the traditional model of diffusion (propagation). The diffusion model assumes that the acceptance of any innovation is a function of realizing that the problem exists, and with the transition to new forms of management there will be the right of everyone to choose the option. The personal characteristics of decision-makers, the perception of benefits associated with acceptance and their psychosocial orientation are also of great importance.

The main component of the questionnaire is not a single issue, but a series of questions that are compositively formed into groups that meet the general intent of the study. The questionnaire consists of three semantic blocks of questions: 1-st block - characteristics of the farm and types of activities; 2-nd block - the characteristics of the individual (in addition to age, education, profession, work experience, questions are raised about the level of knowledge about soil-protective measures, their economic consequences, psychological attitude to their application, etc.).

Below is a fragment of the questionnaire presented, which contains questions, the answers to which characterize the respondent's personality and his attitude to the farming system: 1)age, 2) education, 3). profession,4) position,5) work experience in agriculture, incl. in the last farm; 6) have your parents or anyone in your generation been engaged in agriculture, farming (yes, no, partially); 7)knowledge of soil-protective measures (I do not know, partial knowledge, average knowledge, full knowledge); 8) psychological attitude to the application of soil protection measures (to apply, not to apply, partially apply); 9) attitude to the environment when carrying out soil protection measures (assesses, does not evaluate, partially assesses);10)the need to obtain knowledge on the application of soil protection measures (should be obtained, partially obtained, should not be obtained); 11)awareness of the risk of acceptance of soil-protective technologies (realized, not realized, partially realized).

The third block of the questionnaire aims to identify factors that affect the application of soil protection measures (awareness of the need for application, profitability, etc.).

Below is a fragment of the questionnaire, which presents questions and variants of evaluation criteria with a scale continuum of four quantitative parameters in order of importance (not important, not very important, important, very important):

- awareness of the fact that soil protection measures must be applied on the site;
- economy on production costs;
- demonstrated profitability of soil protection measures;
- the need to purchase soil protection equipment;
- access to information on soil protection measures;
- potential loss of production in the application of soil protection measures;
- application of capital investments in the implementation of soil protection measures;
- a gap in the agricultural production system when applying soil protection measures;
- the proposed time savings due to the acceptance of soil protection measures;
- the proposed time savings due to the acceptance of soil protection measures; assistance of the state (in paying for costs associated with the use of soil protection measures);
- costs of maintaining soil protection measures; making a profit on the invested costs during 2 years of use.

Methodical recommendations for the conduct of sociological research are adapted to the farms of Akmola, Kostanay, Karaganda regions, and the Altai Territory. The number of respondents was 340 people. Socio-economic conditions of vital activity of farm workers were studied, where a survey was conducted. As interviewed experts - representatives of economic entities, as a percentage of the number of respondents: the head of agricultural organizations - 12, the main agronomists - 16, agronomists of structural units - 12, brigade leaders of field teams - 34, heads of farms - 26.

The questions are included: "To what extent are you familiar with the elements of soil protection technology?" At the same time, the concept of familiarity with technology was detailed, i.e. information awareness on the system of machines, methods of soil cultivation, crop rotations, fertilizer system, plant protection system.

The survey reveals an understanding of the need for additional systematic studies on soil protection technology. Following questions are included: "What is the source of information on soil protection technology for you? How often do you get information on soil protection technology from various sources?"

At the next stage, a measure of the awareness of the problem was revealed and the presence of a factor of economic motivation as a result of the use of certain technologies (Table 1). The questionnaire includes the following questions: Is wind erosion a problem for your farm? Is there a risk to the economic conditions of the farm when applying soil protection technologies? Do you consider profitable use of soil protection technologies?

In a similar way, surveys were conducted in the early 1990s [Camboni, Sylvania M., Ted J. Napier. 1992, [7] Hooks, Gregory M., et al, 1987. [13], [15, p. 23]. The consistency of the methods of researchers regarding decision-making by landowners on the technologies used was found (Camboni, Sylvania M., Ted J. Napier, 1992, Hooks, Gregory M., et al, (1987) [7, p. 112], [12, p. 309].

4. Results

The decisions of economic entities are influenced by macro-social, micro-social factors, state policy. The reliability of these provisions for the regions of Siberia and Kazakhstan was confirmed.

In natural and climatic zones, where there is a real danger of loss of fertility due to soil erosion, up to 80% of farmers are concerned about survival in the short term, and do not show concern for preserving the soil for future generations. About 75% of spondents know little

about soil protection agriculture, they do not realize the danger of wind erosion, other forms of destruction, they are not sufficiently informed on the system of crop rotation, plant protection, application of fertilizers and pesticides» (V.Stukach., 2015) [15, p. 23].

Among the macro-social factors, an important place is taken by the demographic situation. Demographic "pressure" leads to the fact that as the population increases, the demand for cultivated land grows, and since the area of arable lands is limited, then the production of products is attracted by the worst wastelands. The second factor - "poverty" is that farmers who work on wastelands will use land resources for depletion; they are concerned about their survival, not the preservation of natural resources. The third macro-social category factor is state policy.

It may impede soil protection activities, for example, at the farm level; in particular, the artificial maintenance of high prices for products obtained from eroded lands, will increase the loss of this kind of soil, i.e. landowners will have an incentive to cultivate them to generate higher incomes. The use of investments in mechanization, chemicalization will hide the negative impact of soil losses on production. Landowners can apply on lands various technologies and ignore losses from erosion, because the output of products will remain at a high level.

Micro-social factors have a decisive influence on the choice of decisions regarding the use of technology. Among the micro-social factors: a measure of awareness of the problem and the actions undertaken, access to information, economic efficiency (profitability), a measure of mastering knowledge and skills in regards of technology, and others directly affecting the behavior of the person managing the land.

Quantitative illustration:

Table 1 – Respondents' assessment of the measure of awareness and economic motivation of the soil protection system of agriculture

Content of assessments	Intensivity*
1. The threat of soil erosion is very high	+
2. In certain years, losses can be significant	+ +
3. The threat is insignificant, or it is not present	+ + +
4. Soil protection technology is obviously affective	+ + +
5. Direct economic effect is not noticeable	+
6. The use of soil protection technologies in certain years can jeopardize the harvest	–
7. Soil protection technology - profitable business	+ + +
8. You can save on processing, but lose the crop	+
9. There is no economic effect from the technology	–

** Scale of assessment: + up to 20%, ++ up to 60%, +++ more than 60%*

As noted earlier, the research objective is to develop a methodology for research that allows to obtain a quantitative understanding of the factors that influence the content of decisions and specific actions that are carried out by business entities on zonal nature conservation systems of agriculture and develop proposals for overcoming negative phenomena in this area.

The status of the respondent in relation to ownership of property and the form of ownership of land are essential. The attitude of respondents to self-management in the form of a peasant household is taken into account, since to a certain extent it characterizes their position; the respondents` competence availability to make decisions regarding technological measures. To identify this, the questionnaire includes following questions: "Who in your household decides on the structure of crops? Who in your household makes decisions on the issues of technology of land cultivation and crop care?"

Processing and analysis of the problems selected for survey showed that respondents have an idea of soil protection technology, they aware about the information channels, understand the threat of the soil erosion to harvest, and evaluate the use of soil protection technology as a positive economic factor. The analysis, moreover, allows us to state that the decision-makers for the interview period basically have property and land on the basis of the right of economic management.

Currently, decisions are made regarding the use of technologies by both heads of primary units and farm specialists, which demonstrates the validity of the respondents selected for the survey.

The decision-making entities have stable idea on the use of soil protection technologies, the idea of the prevailing stereotypes, the preferable parameters of soil protection technology, it was possible to compare the prevailing preferences of the majority of decision-makers regarding technological measures and those parameters that are important from the point of view of science, but not recognized by practitioners.

The relation to flow and industrial technologies in agriculture is defined. It is proved that the landscape-ecological approach to land use is the most acceptable one. However, in practice, many want to see the field in the form of large "cells" (400 to 500 hectares). With such a "geometric" approach, solonetzic impregnation is included in turnover, a rise to the surface of the solonets layer and other disturbances is permissible. Practice has shown that in- line technologies for cultivating land do not ensure the growth of yields, lead to "depersonalization" of the land, create the illusion that the farmer's "breadwinner is not the land, but the tractor" [14, p. 431]. This is confirmed by the results of surveys.

5. Discussion

After identifying possible points for efforts to implement zonal technologies, the matter of the mechanism of impact on those who use technology was considered. In the arsenal can be both economic, and organizational and legal and educational methods of influence. Among them are state environmental protection programs, legislation, economic sanctions, training of staff, educational programs, activities of state consulting services.

The carried out research, allow to draw conclusions and make suggestions regarding the provision of food for needy and environmental protection, in conditions of reforming agriculture.

In the process of reform, public authorities need to foresee the social and economic consequences that directly affect the natural environment. It is expedient to study the influence of reforming of property, infrastructure, investment policy on the environment, depending on the following factors:

- privatization of farms and funds directed to protect soil and maintenance of land reclamation systems;
- incentives and obstacles for achieving greater efficiency in the use of water and other resources;
- price, subsidies and trade policies in agriculture on the consumption of fertilizers, pesticides, the state of soil cover and groundwater;
- the effects of market and price reforms on the structure of crops grown and on the use of water and other resources.
- Reform of science and education should be conducted in the direction of promoting the development of environmentally friendly farming technologies. Many farmers, heads of peasant households, other types require training in the use and storage of chemicals. Special attention should be paid to the development of linkages between producers and science in order to ensure the practical application of the results of priority scientific research. Private firms involved in the supply of raw materials and marketing should receive scientific support from the state.

The proposed methodology can be a working tool for studying and adjusting the processes associated with the economic behavior of employees in relation to the use of zonal technologies in agriculture.

Based on the prevailing views, each stage of economic and social development of society corresponds to its correlation of priorities in the activities of the enterprise. These priorities are formed by interested groups that determine the company's politics. Depending on the economic situation in a market economy, the firm determines priorities. Among such priorities are usually identified: satisfaction of interests of consumers, provision of profitability and growth of the enterprise, satisfaction of inquiries and welfare of workers of the enterprise, protection of environment.

The profitable work of the enterprise, generally, determines the ratio of these priorities in a decisive way. The reaction of an economically weak enterprise to the problems of the "public good", which are nature protection technologies, is quite natural.

If we trace the dynamics of the movement of priorities in the range of the economic state of the enterprise from the level of survival to high profit, then the following order of transition from the lowest to the highest priority levels can be traced (Table 2).

Table 2 –Hierarchy of priorities depending on the level of profitability of the enterprise

Priorities	Place in the hierarchy by profitability levels		
	High	Moderate	Low (survival level)
1.Ensuring profitability and growth of the enterprise	4	3	1
2.Meeting the needs	1	1	2
3.Meeting the requirements of employees of its company	2	2	3
4.Environmental protection	3	4	is not among the priorities

As can be seen from this table, enterprises with low incomes do not mention the prevention of soil degradation in the priority list. First of all they care about their own survival in the short term. It is legitimate to conclude that economic entities will solve socially significant prospective tasks only if their profitable work is provided and the profit is higher, the more the enterprise is interested and able to care for the environment and the application of soil protection technologies.

The activity of the self-government bodies is aimed at the development of cooperation and the involvement into the system of domestic food aid of small forms of management, personal subsidiary farming. A clear and transparent state order for significant volumes of

agricultural products of a certain quality stimulates agricultural producers to introduce innovative approaches to agriculture, expand production, cultivate new crops for this region, and increase the number of beef and dairy cattle.

6. Conclusion

It has been revealed that - along with social importance, the motive for the development of the system of domestic food aid in transition economies is overcoming WTO restrictions on direct support of commodity producers;

- decisions on technologies in agriculture, protection of the soil layer from destruction are affected by macro-social, micro-social and public policies;
- poverty in the farm sector carries the economic and socio-cultural preconditions for the development of a negative scenario, preserve the tendency to destroy fertility and physical condition of the soil layer of land.

In the field of state regulation, the priorities are as follows:

- support of domestic producers and processors of agricultural products within the framework of the green box of WTO norms;

- leveling the difference in income of farmers working on poorly-managed land and agents engaged in intensive farming, poverty prevention in the farm sector using state support instruments, within the framework of targeted programs;
- to conduct scientific research in the field of informal institutions, mechanisms for motivating farmers to apply environmental protection technologies, the use of degraded lands;

Practical recommendations:

- motivation of land owners to take care of the land, preserve the land in a healthy state for future generations;
- difference in income of farmers working on unfit for intensive farming lands and market agents engaged in intensive farming should be covered by targeted state support programs;
- conduct scientific research, focus on the creation of cost-effective and environmentally sound technologies; retraining of personnel for the private sector, an effective system of agricultural advisory services;
- state monitoring of conditions for the profitable work of farms, financing of soil conservation measures; price, subsidized and trade policy in agriculture; control of fertilizer consumption, pesticides, fertility in the soil, groundwater status.

Conflict of Interest

None declared.

Конфликт интересов

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