Global approaches and assessment of sustainable development: a case study of two districts in Russia and Laos

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Abstract. The present paper is concerned with the assessment and comparison of ecological and socio-economic development in Duminichy district of Kaluga province (Russia) and Yotlik district of Vientiane province (Laos). This study focuses on the environmental conservation and efficient nature management and proposes a system of indicators for the assessment of sustainable development at the local level. This system includes 43 indicators which correspond to the international requirements and approaches. The assessments were based on the global principles of sustainable development and local characteristics of each area. They helped to determine significant problems in the development of those two districts in Russia and Laos as well as to find the way to resolve the problems.

1 Introduction

The concept of sustainable development is currently a conventionally accepted strategy for the development of the world community. This concept aims at harmonizing the economic, social and ecological aspects of society, solving prospective socio-economic problems and, at the same time, conserving the environment.

The Earth Summit that was held in Rio-de-Janeiro in 1992 provides a definition of the term ‘sustainable development’ as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The necessity of the system performing monitoring and assessment of actions leading to sustainable development was proposed by the world community. This system has to establish indicators aiding the identification of economic, social and ecological changes.

The quality and comprehensiveness of information about integrative characteristics of a particular area directly depends on the system comprising particular socio-economic and ecological characteristics [1, 2].

The aim of the present study is to estimate and compare general socio-economical and ecological aspects of sustainable development of Duminichy district of Kaluga province

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(Russian Federation) and Yotlik district of Vientiane province (Lao PDR) on the basis on global principles and local characteristics. Yet, such comparison will help to develop efficient management by using indicators of sustainable development.

Based on the fact that Russia and Lao PDR have largely different geographical, climatic, natural and socio-economic conditions, it is not possible to select analogous districts which would have similar population, size, composition of natural resources and similar level of economic development. Therefore the selection of districts in Russia and Laos is based on three fundamental criteria:

- Share of land resources (per person) providing life support for the community.
- Size of area occupied by forest (including the forest of the national park and reserves).
- Direction and level of development for main economic sectors.

The access of the population to land resources is the basic element of the stable way of life providing minimal impact on environment.

In the narrow sense the term land is defined as an object possessing its own topography and special spatial characteristics. According to integrative geographical approach the term land includes soil, minerals, water and biota. These components form an ecosystem keeping integrity supporting life and productivity of environment and at the same time providing opportunities for all kinds of economic activity. The satisfaction of needs by means of land resources is necessary for sustainable development of community. However, land recourses, as fundamental elements linked with other types of natural resources, have to be used in the most efficient way to get benefit from all their components [2, 3, 4].

The total size of Duminichy district (Kaluga province, Russia) is 117393 ha, while the population is 15197 people. Hence the share of land resources per person is 7.7 ha.

The total size of Yotlik district (Vientiane province, Laos) is 189015 ha, while the population is 27510 people. Hence the share of land resources per person is 7 ha which is comparable with the same value for Duminichy district.

The selection of the second criterion is based on the fact that forest resources are notable elements influencing all components of biosphere. Forest performs some essential functions, supporting life of the human community. These functions are as follows: organic matter production during photosynthesis; regulation and filtering of water flow; prevention of soil erosion, destructive impact of flood and water kill, soil washout and formation of ravines; conservation and improvement of soil fertility; biodiversity conservation; production of atmospheric oxygen and carbon fixation; climate formation and prevention of air pollution.

Forest is of great importance for supporting life on Earth as well as for the economic development of particular districts. Forest resources are one of the main sources satisfying ecological, economic, social, cultural and spiritual needs of the current and future generations. These needs include forest products and other services such as timber and timber products, water, food production, pharmaceutical goods, fuel, dwelling, recreation, habitats for wildlife animals, landscape diversity, absorbers and reservoirs of carbon etc. Therefore it is necessary to take measures regarding conservation in order to protect several aspects of forest [5, 6, 7]. Being renewable, forest resources have to be used according to sustainable basis, which directly corresponds to the purposes of conservation.

The sustainable development of any area depends on the ability of the landscape to perform the main human life support functions, which, however, might be affected by the anthropogenic pressure. These functions can be implemented by natural undisturbed landscapes which altogether constitute the ecological stock of a particular area. The higher the value of this stock is, the better is the protection for the area and sustainable landscape development [8, 9, 10]. A noteworthy role is played by lands of forest stock located within intact nature. These lands keep ecological balance and support high standards of life. Extermination and destruction of forest systems and components lead to the loss of

environment regulation and affect the satisfaction of human needs, provoking imbalance in social and economic sectors.

According to the analyzed theoretical sources, the optimal share of intact lands (that is usually constituted by resources of land stock, national parks and reserves) within the land stock has to be at least 70% [11, 12, 13].

The considered districts of Russia and Laos have a fairly high percentage of forest lands in respect to the total size of districts: Yotlik district has 71% (135002 ha) and Duminichy district has 60% (70597 ha) of land covered with forest.

The selection of the third criterion is based on the fact that material production and development of different economic sectors determine the impact of the productive forces on the environment. The condition of natural resources and environment tells on the socio-economic conditions of a district [14, 15, 16].

The use of natural resources can be always accomplished in a great deal of ways which are determined by socio-economic and ecological factors. Man changes, improves and chooses the ways of nature management, but only within a range defined by nature and society development. The nature of a particular region is the source of minerals and energy as well as human environment. It corresponds to purposeful socio-economic activity satisfying long-term needs of society in natural resources and standards of life [17, 18].

The economy of Duminichy and Yotlik is characterized by agricultural production (corn production, cattle and fish breeding), woodworking industry, timber and non-wood production and some sectors of food production. Such economic development depends on the availability of land suitable for agriculture and forest.

Herein, we propose a system of key indicators for sustainable development in order to conduct integrated ecological, social and economic assessment of the mentioned districts in Russia and Laos. We have tried to make this system compatible with the previous and future studies and therefore it can be developed and applied in further research taking into account the specific conditions of a particular region.

In describing and developing the system of indicators we follow the conventional international approaches [17, 18]

The proposed system of key indicators of sustainable development on the district scale is given in Table 1.

Table 1. The system of key indicators for the sustainable development assessment in the city Duminichy and the city Yotlik districts.

Agenda 21	**Indicators (motive power)**	**Indicators (current conditions)**	**Indicators (response)**
SOCIAL INDICATORS			
Demographic dynamics	1. Index of natural population increase (decrease)	2. Population density (person/km^2) 3. Male-female ratio 4. The share of underage (up to 18) population within the total population	5. Index of birth rate (per 1000 persons) 6. Index of death rate (per 1000 persons)
Health protection	7. Sickness rate	8. Index of infantile death rate (number of the deceased under the age of 12 months per 1000 infants born alive) 9. Average life expectancy (males and females)	10. Number of hospitals per 1000 persons 11. Population size per one medical staff

Agenda 21	**Indicators (motive power)**	**Indicators (current conditions)**	**Indicators (response)**
Education & Awareness		12. Average term of study at school	13.Number of students/pupils per one educational institution 14. Coverage (%) of cities and settlements by mobile communication
ECONOMIC INDICATORS			
Economic development		15. Turnover of organizations depending on sectors of economical activity 16. Number of industrial companies (taking into account sectors of their activity)	17. Size of per capita investment in fixed capital ($)
Consumption characteristics	18. Share of areas under crops in the total area 19. Energy consumption per capita	20. Size of area under crops per capita 21. Numbers of livestock (particular species) 22. Fish production (ton)	
ECOLOGICAL INDICATORS. Sustainable water consumption			
Fresh water quality	23. Share (%) of dumped (polluted) sewage per total volume of drain in to surface waters	24. Volume ratio of underground and surface water per total volume (%)	25. Percentage of water saving in system of circulating water supply
Sustainable land use			
Integrated approach to land resources		26. Percentage of modified (built-up) lands in the total regional area 27. Intensity of land use (population size per 1 km^2 of urbanized area) 28. Percentage of water area in the total area	
Ecosystem management		29. Percentage of disturbed and polluted lands	
Sustainable development of agriculture		30. Percentage of agricultural land in the total area	31. Percentage of cleared and improved land in the total size of area

Agenda 21	**Indicators (motive power)**	**Indicators (current conditions)**	**Indicators (response)**
Sustainable forest use			
Forest vanishing	32. Indicator of prescribed felling	33. Percentage of forest land 34. Forest categories (categories regulating forest usage and categories regulating forest conservation)	35. Reforestation
Conservation of landscape and biodiversity			
Biodiversity conservation			36. Percentage of protected areas in the total area of the region
Air quality			
Air conversation and climate change	37. Specific volume of emission into atmosphere from permanent sources per capita		38. Share (&) of collected and processed emission from permanent sources
Sustainable use of waste			
Waste management		39. Volume of produced waste per person (ton a year)	40. Share (%) of used and processed waste in the total volume of accumulated waste 41. Provision with specialized infrastructure for the utilization of waste
INSTITUTIONAL INDICATORS			
Structure of decision making		42. Local statistical system for conservation and indicator establishment (yes/no) 43. Programme and documents for sustainable development of region (yes/no)	

We analyze the considered districts in Russia and Laos using established indicators. This analysis makes it possible to identify the serious problems preventing sustainable development and the prospective ways of the further development of the districts. The current analysis is based on the data provided by the national statistical departments. The obtained comparative results for the city Duminichy and the city Youlik are given below.

2 Social aspects of sustainable development

Duminichy has one town and thirteen villages. All of them are inhabited by 15,197 people.

Yotlik district includes 59 villages populated by 4,672 families numbering 27,510 people: 13,786 males and 13,724 females. There are following ethnic groups in the district:

- Lao Lum, 1,299 people, including 6,552 females (47.22%);
- Khamoo, 13,095 people, including 6,484 females (47.60%);
- Hmong, 1,424 people, including 688 females (48%).

In Duminichy district, like in the entire Kaluga province, the population naturally decreases annually. For example, index of natural decrease (per 1,000 persons) in 2008 totals 11.0 persons. It is noteworthy that this value is 1.5 times higher than for Kaluga province (7.3) and, on the average, for Russia (6.5).

In contrast, Yotlik district is characterized by a natural increase in population. The index of increase totals 27.37 (per 1,000 persons) in 2008. The value of the index is compatible with the average values estimated for Laos where the rate of growth is 2.34%.

The stability of age and sexual structure of population can be estimated, using the ratio of males / females and taking into account the share of persons of able-bodied age (18). Yotlik has an approximately equal ratio of 100 females / 100.45 males. In Duminichy the number of females and males is different, 100 males / 119 females.

The age structure of Duminichy is characterized by the dominance of elderly people over infant population; the former represent 14.6% of the total size of population in 2008. The share of infant population in Yotlik is 1.8 times higher than that in Duminichy and makes up 24.5%. However, the latter value is less than the average one estimated for Laos. The population of Laos, on the average, has the following age structure: under age 15 - 42,7 %, 15-65 - 53,8 %, older than 65 - 3,5 %.

In 2008 the birth rate index for Duminichy totals 10.2 per 1,000 persons, which is a little higher than the average value for Kaluga province (10.0). This rate of birth is remarkably less than that for Yotlik totaling 34.46 per 1,000 persons.

In 2008 the index of death rate in Duminichy totals 21.2 per 1,000 persons, which is higher than the average value for Kaluga province (17.3). The death rate is two times higher than that for Yotlik (11.02 per 1,000 persons).

The analysis of the obtained results in the “Demographic dynamics” section shows the following characteristics of the medical and demographic situation for Duminichy and Yotlik:

- The current rate of birth for Duminichy does not ensure the reproduction of population and replacement of generations (2.15 births for 1 female) due to the transition to small-size families. In Yotlik, the rate of birth is 4.5 births;
- High and still growing death rate in Duminichy districts;
- Stable natural decrease in population in Duminichy and stable natural increase in Yotlik;
- Unstable age structure and average aging of population in Duminichy. This can be explained by the increasing number of elderly people and the decrease in infant population. At the same time, population under able-bodied age prevails in Yotlic.

The index of infant mortality (the number of the deceased under age 1 per 1,000 persons born) is one of the main sensitive indicators of social wellbeing and population health. This index is linked with all general factors of society and environmental quality.

In 2008, there were 25.6 recorded deaths of infants under age 1 per 1,000 births, which is approximately three times higher than the average value for Kaluga province (8.7). Despite the fact that this value is rather high for Duminichy, it is remarkably less than the one for Yotlik (79.61).

The conventionally accepted indicator of sustainable development, the index of life expectancy, totals 66.6 for Duminichy in 2008 versus 65.9 for entire Russia. At the same time this index differs greatly if estimated for males and females separately. The expected length of life for females is 73.5. while for males it is 60.2.

The average life expectancy for Yotlik is ten years less than that for Duminichy and totals 56.29. It is noteworthy that the expected value is 15 years less for females and 6 years for males.

In 2008, the sickness rate per 1,000 persons (the diagnosis registered for the first time in life) for Duminichy totals 558.0, which is less than the average value for Kaluga province (836.6). The official records of sickness rate for Youtlik are unavailable.

Duminichy has 22 hospitals, which means the ratio of 0.7 medical institution per 1,000 persons. In Yotlik, there is only one local hospital, 2 village clinics and 22 medical assistant posts. Therefore the index totals 1.1 medical institutions per 1,000 persons.

Eighteen doctors and other 105 persons of medical staff are employed at medical institutions in Duminichy. This indicates the ratio of one medical worker per 123.5 persons.

In Yotlik, thirty-nine medical staff and their 59 assistants are employed at medical institutions. One medical professional, on average, is shared by 280.7 people, which is twice higher than in Duminichy.

The analysis of obtained results for “Health protection” section made it possible to identify the following problems of public health in Duminichy and Yotlik:

- Permanently high rates of infantile mortality in Duminichy as well as in Yotlik
- Decrease in life expectancy in Duminichy, especially for males, resulting in disease before retirement age. Relatively low life expectancy in Yotlik, especially for females.
- Despite the fact that Yotlik has, on the average, more medical institutions than Duminichy, the quality of medical services in Yotlik is inferior to that in Duminichy, which results in higher rate of sickness and worse state of health.

The education quality and training of qualified specialists are important social factors for sustainable development as well.

Duminichy has 6 preschools, 16 schools comprising 1,683 children, which means that, on the, one school is shared by 76.5 children.

At the same time, Yotlik has 3 preschools, 39 elementary schools (the term of study is 5 years), 4 secondary school (the term of study is 3 years) and 1 high school (the term of study is 3 years). All preschools and schools combined include 6,742 children, resulting in 143.4 children per one school/preschool. It is noteworthy that this value is two times higher than that for Duminichy.

The average term of study at school lasts 10 years in Duminichy and 11 years in Yotlik.

In modern world the size of urban and suburban area covered by mobile phone service is an important index showing the availability of communication. In Duminichy only 65% is covered by mobile phone service, which is less than the average value for Kaluga province (90%).

Yotlik has around 90% of area covered by mobile phone service and there are four mobile companies: Lao (ETL), Starphone Lao Asia Telecommunication Company, TIGO Lao company and Lao telecom company working there.

The analysis for “Education & Awareness” section shows the following results:

- Yotlik district does not have enough preschools and high schools;
- In Duminichy, the area covered by mobile phone service does not sufficiently meet the needs of the residents.

3 Economic aspects of sustainable development

The industry in Duminichy is represented by 19 businesses with the gross production totaling more than 360 million rubles in 2008. The share of production of small and medium businesses totals 81%. The major businesses in the district are: Duminichy meat-packing plant, Duminichy milk factory, Duminichy bread-baking plant, Tsvetnoi kolodetz (production of non-alcoholic drinks), Duminichy sanitary engineering factory, Chernyshevsky forest plant (production of veneer and plywood), Garant-AS (production of bricks). Also, there are 7 agricultural businesses, 16 farmers and 4,200 individual businesses. The total production volume of agriculture was 430.6 million in 2008.

The industry in Yotlik is presented by middle and small agricultural businesses and wood-working enterprises, (mostly using non-timber forest resources). In 2008, the gross production amounted to 5,440,750 Lao kip (632.6 thousand dollars or 19.99 million rubles). Yet, in the district, there are 153 plants producing rice flour, 6 plants producing ice and 4 plants producing drinking water. Their total production volume was 121.9 thousand dollars in 2008. As can be seen from these values, the agricultural and industrial production in Yotlik is remarkably less than that in Duminichy.

In Duminichy, agricultural land occupies 30610 ha (2 ha per person), plowed land occupying 22165 ha (1.45 per person). In Yotlik, agricultural land occupies 0.38 ha per person, while plowed land (rice) occupies 0.15 ha per person. The values for Yotlik are noticeably less than those for Duminichy.

In 2008 total livestock number was 3,662 head: cows – 2,037, pigs – 1,416, sheep and goats – 409 in Duminichy. Yotlik has buffalos – 3,901 head, cows – 501, goats – 299, pigs – 2915 and poultry – 48,450. Three elephants are used for transportation of goods in the district.

Duminichy has 2 ponds used for fish production. Their total size of the area is 803.5 ha, constituting 0.68% of the total area of the district. The largest pond “Rubny” occupies 790 ha and is used for the breeding of European carp, silver carp and another marketable fish Ctenopharyngodon idella. The existing potential makes it possible to produce up to 1,000 tons of fish a year.

Yotlik has 153 small ponds used for fish production. Their total size is 26 ha (0.01% of the total size of the district). More than 136,970 young fish are put in the ponds annually. The volume of fish production totals around 50 ton a year.

The most important characteristics, showing capital investment for purchase, reconstruction, and modernization of main funds in all economical sections, is the per capita volume of investment in the fixed capital. The volume of investment in the fixed capital also includes investments intended for ecological development, therefore this volume can serve as an indicator of public response to the changes of environment. Such indicator exhibits the possibility of extending and reconstructing industrial facilities by means of innovational and ecologically efficient technologies.

In Duminichy, the volume of investment in main capital totaled 135,507 thousand of rubles (8,860.1 rubles per person) in 2008, which is less than the average number for Kaluga province (25,940.2 per person).

The volume of investment in Yotlik totaled 27,014 thousand rubles (854.9 thousand dollars) and 981.9 rubles per person. This rate is nine times less than that for Duminichy. The greater part of investment (70.3% of the total) went to agriculture and timber production.

4 Ecological aspects of sustainable development

4.1 Sustainable water consumption

In Duminichy the total water intake amounted to 2.72 million cubic meters in 2008. The water intake from surface water supply totaled 2.2 million cubic meters (81%), while the intake of underground water was 0.52 million cubic meters (19%). The consumption in the systems of circulating water supply equalled 0.5 million cubic meters.

In Yotlik, the water intake for agriculture, factories and drinking purposes was implemented by means of underground water supply due to the inadequate quality of overground water.

The share of sewage not treated by water treatment plants and dumped into surface water totals 100% in both Duminichy and Yotlik.

As it can be seen from the analysis, the high percentage of dump sewage indicates the lack or inefficient use of sewage facilities and violation of exploitation regulations.

4.2 Sustainable land use

The indicators of sustainable development are linked with issues related to restoration and conservation of land. Sustainable land management implies efficient use of land in settlements by means of target building with the minimal use of land under agriculture and conservation. Yet, it also implies quality improvement of developed land through rehabilitation work.

In Duminichy, around 94% land stock is represented by most valuable lands: agricultural land 33 % (39.0 thousand ha), forest land 60% (70.6 thousand ha) and lands under water storage pools – around 1 % (0.9 thousand ha).

The most valuable land of Yotlik occupies around 77% of land stock: agricultural land 5.5 % (10.5 thousand ha), forest land - 71 % (135 thousand ha), lands under water objects and under rocky broken ground – 0.5 % (0.94 thousand ha).

Development of settlements causes an increase in urban areas at the expense of natural and intact lands. To be sustainable the area has to meet the following criteria: 1. An increase in efficient land use; 2. Biodiversity conservation; 3. Rehabilitation of polluted and disturbed lands.

In Duminichy, the built-up area occupies 5.03 thousand ha (around 40%). The index of land use intensity (number of persons per 1 ha of urban area) totals 3 person per 1 ha.

In Yotlik, the built-up area occupies 42.6 thousand ha (around 22%). The index of land use intensity totals 0.7 person per 1 ha which is less than that for Duminichy. The land use map for Duminichy and Yotlik is shown in Figure 1.

4.3 Sustainable forest use

In Duminichy, the percentage of forest land totals 60%, which is higher than that for Kaluga province (44%) and the average one for Russia (46%). In Yotlik, the percentage of forest land totals 71%, which slightly higher than that for Laos (66%).

With a view to usage, the forest in the districts is divided into following categories: protected forest, protective forest and exploitation forest. To sustain the environmental, water protective, sanitary, hygienic, health-improving, and other useful functions of forest, the industrial forest development can be allowed provided the purposes of forest use are compatible with forest functions.

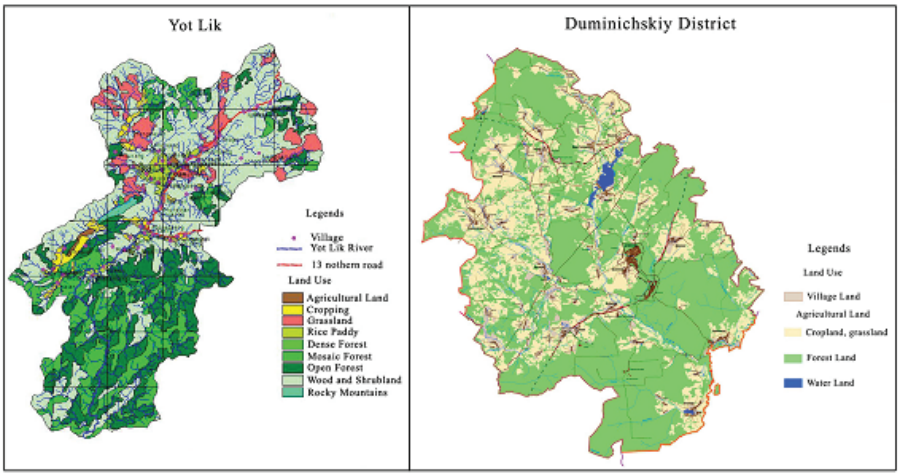

Fig. 1. The land use map for for Duminichy and Yotlik districts.

In Duminichy, operational forests total 64.1% (45,250 ha), protective forests total 35.5% (25,101 ha) and protected forests (occupied by national protected areas) total 0.4% (246 ha).

In Yotlik, operational forests also prevail and total 68.4% (92,348 ha); protective forests total 31.2% (42187 ha), and protected forests total 0.4% (467 ha).

In Duminchy, the volume of prescribed felling totals 100 thousand cubic meters. In 2008, only 25% of prescribed felling was implemented (including 92% of softwood), which is less than the average one for Kaluga province 33.9% (91.1%)

Though there is the Chernyshevsky wood mill producing veneer and plywood in Duminichy, the problem of efficient use of non-valuable wood is not resolved. This problem is caused by low quality of such wood as well as by the insufficient facilities available at the mill.

A decrease in prescribed felling of non-valuable wood leads to the increase in forest area overgrown with non-valuable wood species and hence to the decrease in wood value in the district.

Reforestation is an important ecological and industrial activity providing sustainable development of forest ecosystems. Reforestation includes rehabilitation of forest and forestation. In Duminichy reforestation was implemented on the area of 81 ha (0.06% of the total area) in 2008.

In Laos forest use is regulated by special permission or issuance of licences specifying the volume of wood to be used. In Yotlik reforestation remains a natural spontaneous process, without special forest plantation.

4.4 Air quality

Specific volume of emission from permanent facilities is an important measure for the comparison of emission gas volumes in atmosphere. In Duminichy the permanent facilities emitted 264 tons and the estimated specific volume was 20 kg per person (versus 13 kg for the entire Kaluga province) in 2008. The share of collected and rendered emission totalled 0 (the same share for Kaluga province totaled 89.3%)

Unfortunately, Yotlik lacks any data on air quality.

In the light of the international problem of climate change, it is interesting to evaluate the total emission of substances equivalent to CO_2 for both districts. According to the conclusions of Intergovernmental Commission on climate change, general activities producing

greenhouse gases are: power engineering, industrial processing, usage of dissolvents, agriculture and waste recycling.

Sustainable society is responsible for the wellbeing of future generations and must help solve global ecological problems. Society also has to take measures to reduce the use of irreplaceable resources. On the regional political level, this means energy conservation, use of replaceable sources of energy, and decreasing dumped waste.

Energy is valuable for economical and social development as well as for improvement of life standards. However, for the most part the world production and consumption of energy cannot but change with technological progress as total production and consumption increase. A decrease in air emission and greenhouse gases discharge can be achieved by increasing production efficiency and by using ecologically friendly energetic systems which utilize modern and replaceable energy sources. These modern and replaceable energy sources are for example, sun energy, photoelectric transformation of sun energy, wind energy, water energy, biological energy, geothermal energy, ocean energy, animal and human energy. These types of energy are summarized in the report of the Committee for the use of novel and replaceable energy sources in Rio-de-Janeiro in 1992.

In Yotlik, energy is produced by ecological energy sources, which decreases atmosperic emission. In Yotlik, there are 14 settlements with permanent electric energy supply from water power sources, 24 settlements have temporal electric energy supply from generators, 6 settlements use solar batteries, and the remaining 15 are not electrified at all.

In Duminichy, likewise in the entire Kaluga province, the most harmful industrial facilities are processing factories energy, gas and water production.

4.5 Waste management

In Duminicy, total weight of dangerous waste products is 308.2 tons, which meant 0.02 ton per capita in 2008. These numbers are remarkably less than the average for Kaluga province totaling 0.4 ton per capita.

The total volume of used and processed waste is 158.2 tons (51.3% of the total volume of accumulated waste) and is equal to that for Kaluga province.

Duminichy lacks any specialized infrastructure for the utilization of dangerous industrial waste. Therefore such situation leads to dumping waste at open-air municipal solid waste dumps or illegal waste burial at unauthorized dumps. For the disposal of municipal and low-hazard waste, the district has one dumping area of 3.0 ha.

Yotlik lacks any specialized infrastructure for municipal and industrial waste disposal. The waste is generally buried at unauthorized dumps.

As it can be seen from the analysis, the main problems of waste management are as follows:

- Both districts are insufficiently developed in terms of waste utilization and recycling (especially of hazard waste). Therefore, measures related to conservation of natural resources and prevention of waste do not operate efficiently.
- Yotlik has no waste dump, while in Duminichy the capacity of the available waste dump is not sufficient. Moreover, the waste dump in Duminichy does not correspond to the accepted ecological standards, and hence harms nature.

5 Conclusion

The implementation of sustainable development at the district level requires integrated planning, development of strategies and systems leading to sustainable development, exemplified by the existing local plans or local Agenda 21 for conservation and sustainable development [17].

The development of local plans and programmes of sustainable development must take into account the problems of socio-economic development, efficient use of natural resources, conservation, and establishment of environmental indicators. These problems require the monitoring of accomplishments [18].

In Duminichy, as well as in Yotlik, there is no local strategy or system of indicators for the transition to sustainable development. This testifies to an inefficient local conservation policy. In addition, such policy is not compatible with international standards.

Apparently, sustainable development cannot be implemented in a region taken separately, because this is a global process. However, we must accept that each region is unique in the world, and should occupy its own position in the global system of sustainable development.

To implement sustainable development in Duminichy and Yotlik, we must accomplish the following important actions such as territorial organization of economy (taking into account natural and social factors), determination of priorities in district development as well as building of political, socio-economic, financial, ecological and informational mechanisms.

Despite the world financial crisis, it is necessary to devote special attention to conservation, ecological safety, efficient recourse use, reduction of water resources pollution, drinking water quality, improvement of agriculture, soil fertility and biodiversity conservation.

It is necessary to carry out activities which contribute to decreasing ecological risks related to pollution of agricultural and forest lands and quality of plant growing.

Transition to sustainable development also implies control over industrial and agricultural activity on currently cultivated lands and cancellation of any projects irreplaceably harming environment.

The proposed indicators of sustainable development may serve as a basis that takes into account socio-economic and ecological priorities to make decisions for the nature management in the districts.

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