

Regional Plan in Bahnamirrural District through Environmental Planning Process

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Abstract

Physical development and planning of rural district is one of the most important environmental dimensions in rural areas. It is carried out by establishing spatial framework, in which economic and social activities are implemented successfully. In this regard, the current research was conducted for social, economic, and ecological development and planning in Behnemirrural district, using three major stages of planning process. These three stages included recognition, analysis, and integration. In the recognition stage, the natural, social, cultural, and physical features of the studied region were recognized. In the stage of analysis, facilities, issues, and their causes were analyzed by drawing causal analysis table. Then, issues were weighted and prioritized in terms of intensity, level of effect, and destruction importance. In the integration stage, the general goals were developed given the priority of issues. Then, operational goals and solutions were developed for each general goal and solutions were positioned on the map.

Keywords

Planning Process, Bahnamir, Physical Development, Prioritization

1. Introduction

Various economic and industrial activities and an increase in the population growth and lack of considering the optimum use of natural resources have caused disruption in the environmental balance in urban-rural regions [1]. Thus, environmental planning for appropriate using of land resources and preventing environmental crises are among the issues, which have drawn the attention of managers in the recent years [2]. This issue is considered seriously at large scale

by planners and executives, but less attention has been paid to it at small scale, especially at the scale of the rural districts, including environmental resources. Many Iran's rural districts are at the exposure of severe threats, such as desertification, destruction of forests and pastures, change in land use, decreased level of groundwater, landslide, etc. Moreover, rural spaces are highly important, because large part of their livelihood resources relies on using the environmental resources [3]. However, planning is essential to reduce the damage imposed on these regions and to achieve suitable development by using the potential of each region [4] [5], since natural environment has limited ecological potential for human use [6] [7]. The planning is based on objective facts and natural potentials, so it will be very feasible to achieve the pre-defined goals [5]. Thus, physical development and planning of rural district physical conditions are considered as one of the most important environmental dimensions in rural regions. Physical planning is in fact associated with improvement of living conditions in rural areas by developing a spatial framework, which economic and social activities are implemented successfully within this framework. This framework includes the basic criterion and standard to implement such activities, and necessary communication pattern, including the road network. Physical planning focuses on optimum use of land, water and human resources and access to residential areas, agricultural lands, and socio-economic facilities in the habitat network [3]. Accordingly, the current research was carried out to plan native environment in the Bahnamirrural district and to develop it socially, economically, and ecologically, given the potential of this region. The reason for choosing a rural district as a planning unit is that, in moving towards sustainable development, special emphasis has been put on the role of planning on a local scale [8].

2. Methodology

2.1. Introducing the Studied Area

Behnemirrural district is one of the rural districts located in Bahnamir district of Babolsar city in the Mazandaran Province. It covers an area of 75.81 sq. km. It is located at 52 degrees and 47 minutes in east and 36 degrees and 40 minutes in north. It is neighbor with Joybar and Sari cities in east side, with Babolsar city in west side, with Caspian Sea in north side, Azizakrural district and Babol and Ghaemshahr cities in south side (**Figure 1**).

2.2. Method of Study

Three stages of research to achieve the local planning goals in development of Behnemarrural district as follows: 1-Recognition of current status, 2-Analysis, 3-Integration.

Geographical Information System (GIS) was used in order to operationalize the described the process.

Stage 1: Recognizing the current status

It is necessary to pay attention to spatial and temporal conditions of the studied

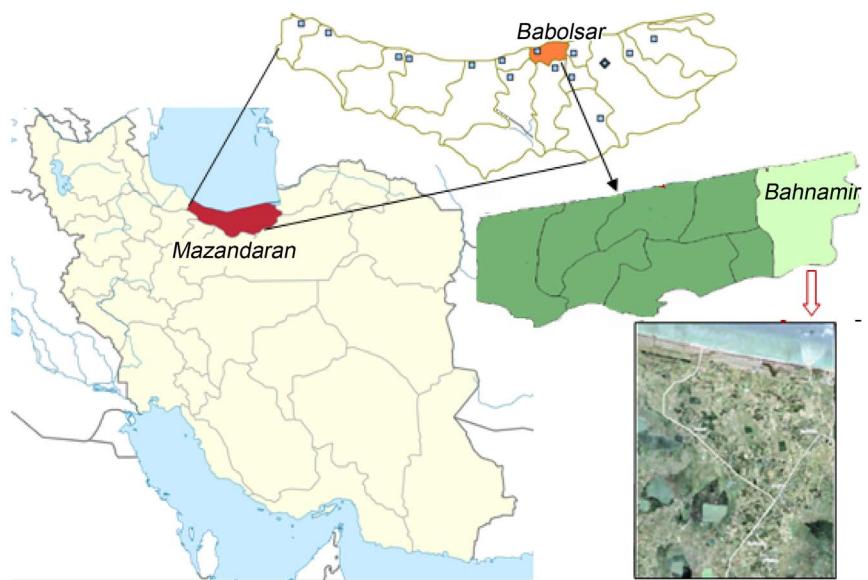


Figure 1. Introduction of the studied area.

area in each planning and analysis stage, because each planning will be different based on the location and time of research. Hence, the most important stage of this process is to recognize the potential of the studied region. It involves recognizing the natural, ecological, social, economic, and cultural, spatial and physical features of Bahnamir rural district (**Table 1**).

Maps were developed for all of these cases, based on information obtained from different organizations [9] [10] [11]. We refer to some of them here:

Figure 2 displays the justification of the current form of the studied area based on natural and human-made features, in which the probability of natural outcomes such as: Telar River (western side of the rural district), the sea (northern side), rice fields and gardens (eastern side), waterfalls (eastern border), and human-made outcomes such as: roads (southern side) play key role in determining the current borders of the rural district.

Figure 3 illustrates the hydrological status and water resources status of the rural district, in which artery 1 is the artery of main surface water (Telar River), artery 2 is the open water channels, and artery 3 is smaller channels, branched from the main channels.

Figure 4 illustrates different agricultural and residential uses and hydrological networks in the Behnemarrural district. Accordingly, the share of each user classes can be illustrated in the following **Figure 5**. **Figure 6** illustrates the quality of current roads in terms of asphalt, sand, and soil roads.

Given the population and housing census published in 2016, the population of Bahnamir rural districts is 18,232 with 4366 households, accounting for 7% of the total population of Babolsar. The **Figure 7** and **Figure 8** also display the demographic status of rural district in Babolsar province.

Stage 2: Analysis of issues and facilities:

Table 1. Cases studied in recognition stage in Bahnamir Rural district.

Cases studied in the recognition stage	Description of each stage
Defining and describing the studied area	Behnemir rural district region was located given the most distinctive features and the most homogeneous natural (river, sea, waterfall) and human-made (rice fields and roads) zones
Bio-physical elements and processes of studied area	Topography, slope, hydrological network, and water resources, geology, vegetation, plant and animal species and environmental risks
Human processes and elements of the studied area	<ul style="list-style-type: none"> - Social, cultural, demographic, and economic features: distribution of biological points, growth in population over the last 30 years, hierarchy of biological points, changes in the employed and unemployed population, classification of economic resources of the city, factors contributing the attractions and job turnovers - Access network and network, urban and regional facilities: the quality of current roads, the functional hierarchy of roads, the general pattern of roads, production resources, distribution network, electricity using, oil, gas and standard privacies, postal and telecommunications network - Land use and other spatial-physical factors: zoning of the area according to major uses, distribution of protected areas, natural, historic, and cultural areas for tourist attraction, tourism development facilities, hierarchy of distribution of healthcare and educational services, leveling of spatial organization of settlements based on a set of factors regulating the natural and human-made activities - Vision features of the environment: including recognizing different beautiful natural and human-made visions

Given the information obtained from recognition stage, issues, actual and potential facilities of the area were categorized and prioritized with regard to each sectors in this stage of research (natural, human-made and social) as follows:

- Extraction of issues, limitations, and potential and actual capabilities of regional development: After field study of the region and using the views of local experts, the actual and potential issues of the region in each sectors (natural, human-made and social-economic) were extracted at this stage of research.
- Cause and effect analysis: this stage recognizes the cause and effect of issues and strengthens. Then, issues were weighted and prioritized in terms of intensity, level of effect, and importance of destruction of their environment (**Table 2 & Table 3**).

Issues are displayed in **Table 2** and **Table 3** in terms of intensity, level of effect and importance of weight of destruction from 1 (the lowest effect) to 5 (the highest effect). After summing up the weights, issues were classified in priorities

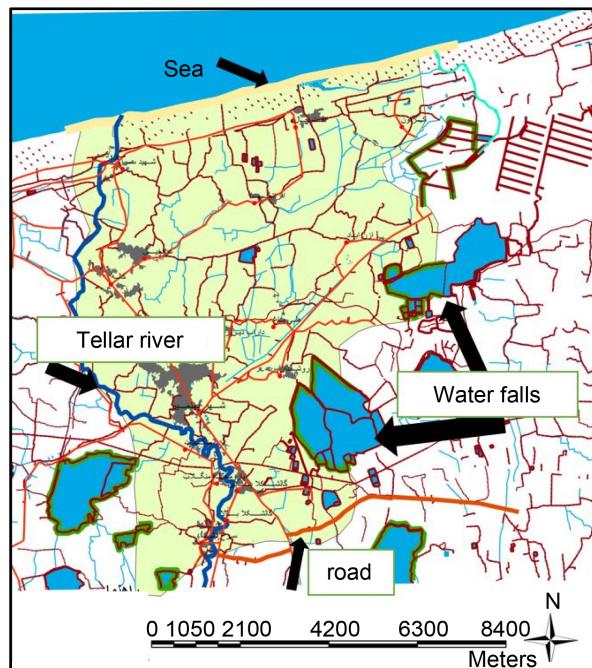


Figure 2. Justification of studied area.

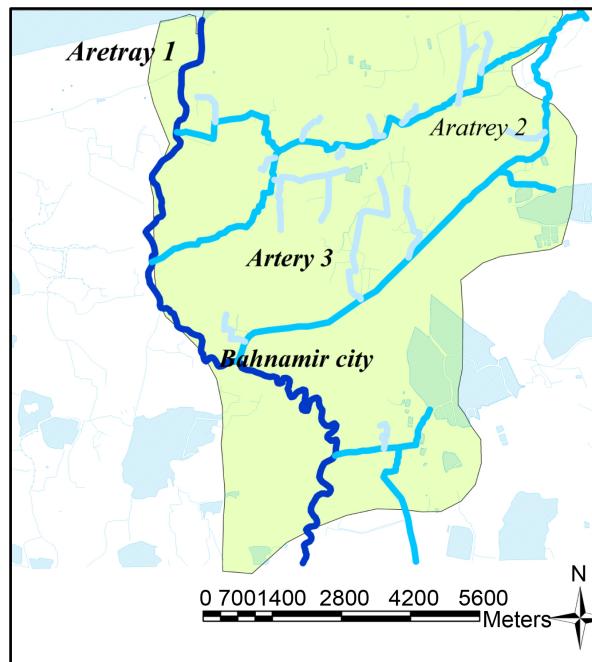


Figure 3. hydrological status and water resources.

1 (the most important) to 4 (the least important). For example, in the natural environment sector, water pollution with intensity of 3, level of effect of 4 and the importance of destruction of 5 and weight sum of 12 is an issue with priority 1 and it should be prioritized to resolve the problem, and the reason for this problem, as stated in **Table 1**, can be underground water surface, using absorption wells for wastewater, using chemical and toxic substances in agriculture.

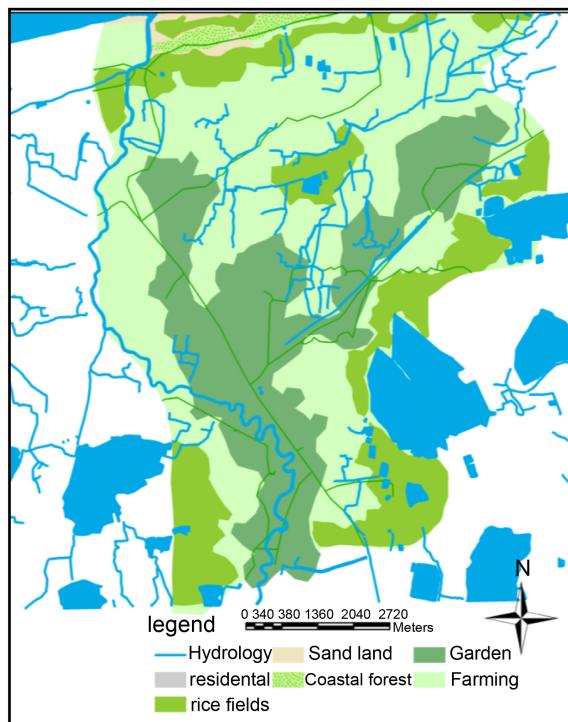


Figure 4. Land use.

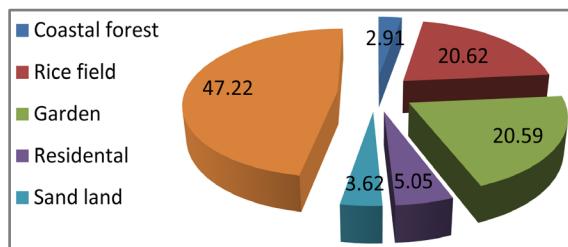


Figure 5. Level of each of land use classes in Bahnamir-rural district.

Table 2 and **Table 3** are related to cause and effect analysis, with regard to issues and facilities of the Bahnamir rural district.

- Positioning the issues and facilities on the map: Issues and facilities were positioned on the map using GIS software and the information obtained from the tables of the previous stage and views of local experts and field studies at this stage. A sample of these maps is illustrated here. **Figure 9** illustrates the most contaminated places as an issue, which included industrial factories near to these areas, causing contamination of agricultural land, rice fields, and coastal forests. Industrial factories can be seen near these places, causing contamination in agriculture lands, rice fields, and coastal forests.

Figure 10 illustrates the areas having capability for husbandry, poultry and aquaculture, which they can be used to develop rural economy and create opportunities for employment.

Stage 3: Integration (development of plan)

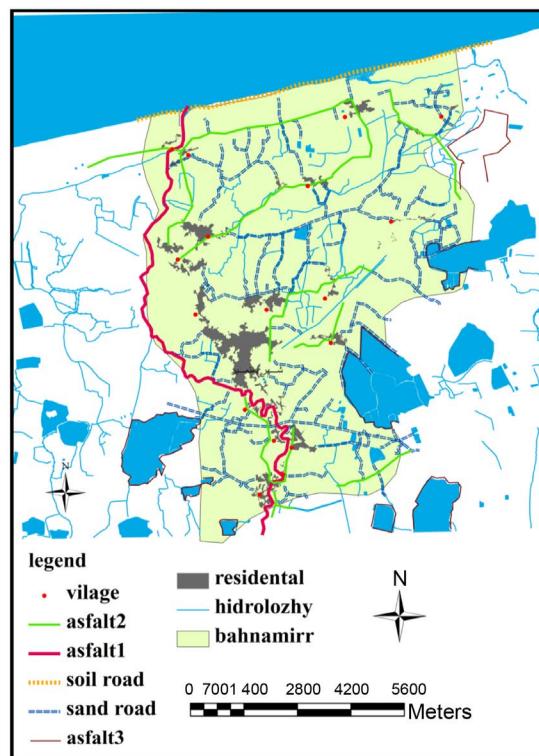


Figure 6. Quality of current roads, asphalt, gravel soil.

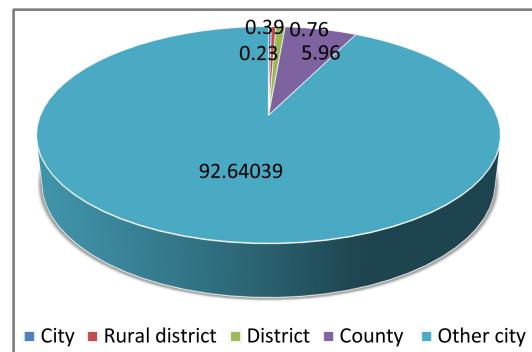


Figure 7. Population percentage of Bahnamirr rural district relative to total Babolsar population.

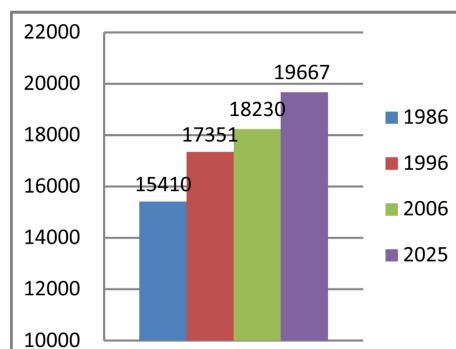


Figure 8. Population changes over the past 30 years and predicting the population in 2025.

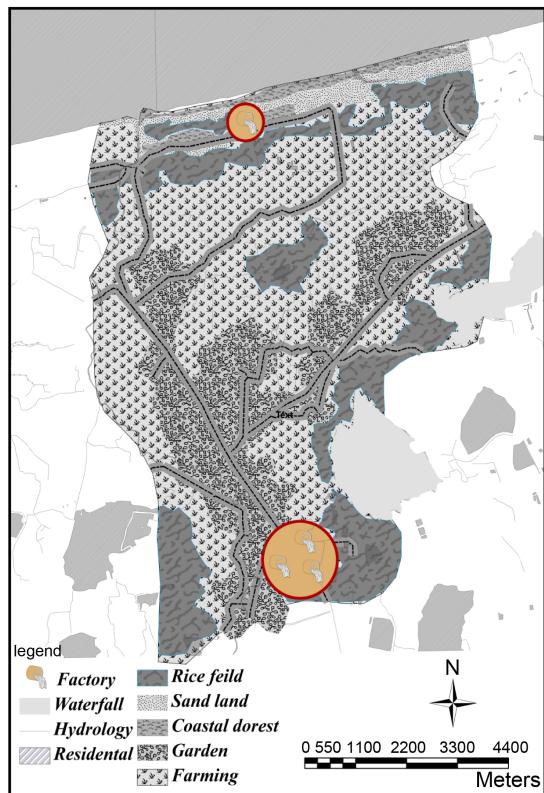


Figure 9. Pollution in the studied area.

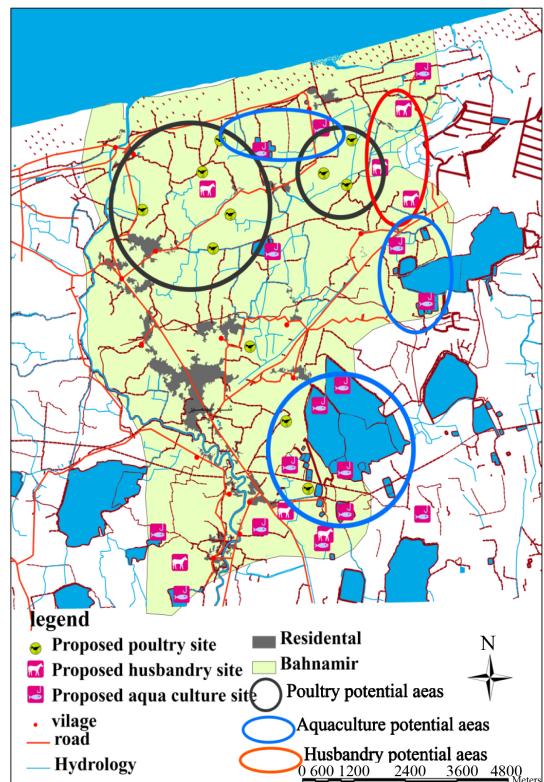


Figure 10. Areas with potential of aquaculture, poultry and husbandry.

Table 2. Analysis of cause and effect of natural and socio-economic environment.

Table 3. Analysis of cause and effect of the human-made environment.

issues	Facilities		
		Cause	effect
Reduced agricultural lands and low production	Land use change from agriculture to construction	Creating different industries related to agriculture and non-agriculture such as food industries, and auto parts company Workshop for packing agricultural products, construction of industrial poultry, workshops to produce building materials	
Environment destruction and pollution	Lack of observing environmental considerations in locating	agricultural lands, waterfalls, rivers, seashore and gardens	
Unemployment in non-agriculture seasons and tendency to other jobs	Seasonal agriculture, low investment in this sector and traditional agriculture	Economic growth and creation job, development of tourism industry	
Destruction of coastal forests and local plants of the region	reduced sand dunes, manipulating coastal forests and vegetation at the margin of river	Growth and development of rural district, easy access to cities and surrounding rural district, business and economic growth	
Change in pattern of habitants from organic to linear	Lack of hierarchy in roads: regional road passing from farms	Passing two roads with regional scale, access to rural rural districts through the asphalt road	
	Development of uncontrolled construction at the margin of roads		
Loss of agriculture lands	Lack of wastewater treatment and appropriate garbage collection and water treatment	Rural development reduced rural migration, easiness of living and well-being, reduced travel to administrative centers outside of the province.	
Lack of attention to legal privacy of roads			
Uncontrolled growth and development of constructions			
Loss of vegetation			
Reduced level of health			
Lack of job consistent with expertise of people, loss of traditional customs, migration	Imbalance in level of services and population growth	Natural and human-made vision, tourism attractions	
Visual pollution and loss of natural visions	Inappropriate disposal of garbage and wastewater	agriculture lands, waterfalls, coast, vision of river, gardens and religious places	

Continued

Evaluation and prioritization of issues		Priority	Total score	Importance of environment destruction	Area of region affected	Intensity
4	9	5	2	2	2	
6	6	4	1	1		
5	8	5	1	2		
1	12	5	4	3		
2	11	3	4	4		
4	9	5	2	2		
4	9	3	3	3		
3	10	4	4	2		
3	10	3	4	3		
3	10	5	3	2		
		12	5	3	4	
4	9	5	2	2		

This stage includes vision, development of general goals, specifying the operational objectives (including types of standards and criteria making it possible to achieve the common goals), initial plans, the integration of ideas, preliminary planning solutions, evaluating and selecting the optimum solution, developing the executive criteria and standards. In the third stage of planning process (integration) in the current research, vision was first specified to resolve the most important issues recognized: environmental protection, natural vision, controlling natural risks, economic development of the region, with regard to agricultural potential of the region. Accordingly, the general goals were extracted in three sectors of the natural environment, socio-economic environment, and human-made environment. Then, a set of operational goals and executive standards was defined to achieve the goals displayed in **Table 4**. For example, use of ecological agricultural methods, resting the land, lack of using the land than its capability, improving the vegetation, developing a wastewater treatment system, adopting limiting laws in using natural resources were a set of operational goals used to be transformed to general goal (appropriate management of soil resources to prevent soil erosion and soil contamination). Then, solutions were specified for each general goal, and executive standards and criteria were defined for optimal solutions. **Figure 11** illustrates the most important solutions. As illustrated in **Figure 11**, river privacy areas and the waterfalls, whose vegetation has been manipulated (an issue in priority) were considered as areas, which need to be protected against construction. The natural vision of these areas should be protected and the conditions need to be provided to increase tourism in these areas, given the tourism potential of these areas. Vegetation of these areas also should be improved to control the flood and increase the physical capacity of the area.

Areas for aquaculture, husbandry, and, poultry are recommended as solution to provide more employment opportunities in rural areas and to prevent migration

Table 4. The process of development of vision, general goal, operational goals, and executive standards and policies.

Studied cases	General goals		
	Natural factors	Human-made factors	Socio-economic factors
Solutions and completing executive criteria and policies	<p>Improving the vegetation at the margin of river, construction of flood walls, dredging of water channels and waterfalls, passing laws to create restriction of construction in privacy of river</p> <p>The construction of the flood wall at the margin of the Talar River by related organizations, determination of privacy for irrigation networks and water pipes by the Ministry of Energy, dredging and organizing of water channels agricultural Jihad organization, use of ecological agriculture methods in depositing pests such as duck breeding in rice fields to combat rice stem borer worms, implementing the plan for improve and integrate agriculture lands by agriculture organization</p>	<p>Using agriculture, ecologic methods, resting the land, lack of using the land more than its potential, improving the vegetation, construction of wastewater treatment, adopting limiting laws in using natural resources, using lighter ecologic facilities instead of using chemical fertilizers and pesticides and if needed, using pesticide with recommendation of experts</p> <p>Development of jobs of husbandry and aquaculture and development of tourism industry and industries related to agriculture</p> <p>Creating technical and vocational centers with the approach of modern agricultural training, equipping existing educational and therapeutic centers</p> <p>Fairly distribution of services in city, creating facilities in low population rural districts, developing plans to define provinces for industrial and residential land uses</p>	<p>1-control of flood, management and protection of water resources, control of natural hazards (especially the control of river flooding to enhance the physical potential of region)</p> <p>Environment protection, natural visions, Control of natural hazards</p> <p>Economic development of region with regard to agriculture potentials of the region</p> <p>3-providing the opportunities for employment</p> <p>4-increasing the educational, cultural and welfare facilities</p> <p>5-population control, training job skills, and life skills to all classes of society</p> <p>6-creating restriction to land uses that destruct the environment and construction of land uses with regard to environmental potentials at the region</p> <p>7-creating communicative roads based on natural conditions of the region, sustainable transportation</p> <p>8-increasing the level of services, creating balance between population growth and level of their service</p> <p>9-strengthening and protecting the natural views (sea coast, river, waterfall), increase of industry tourism</p>
Operational goals			

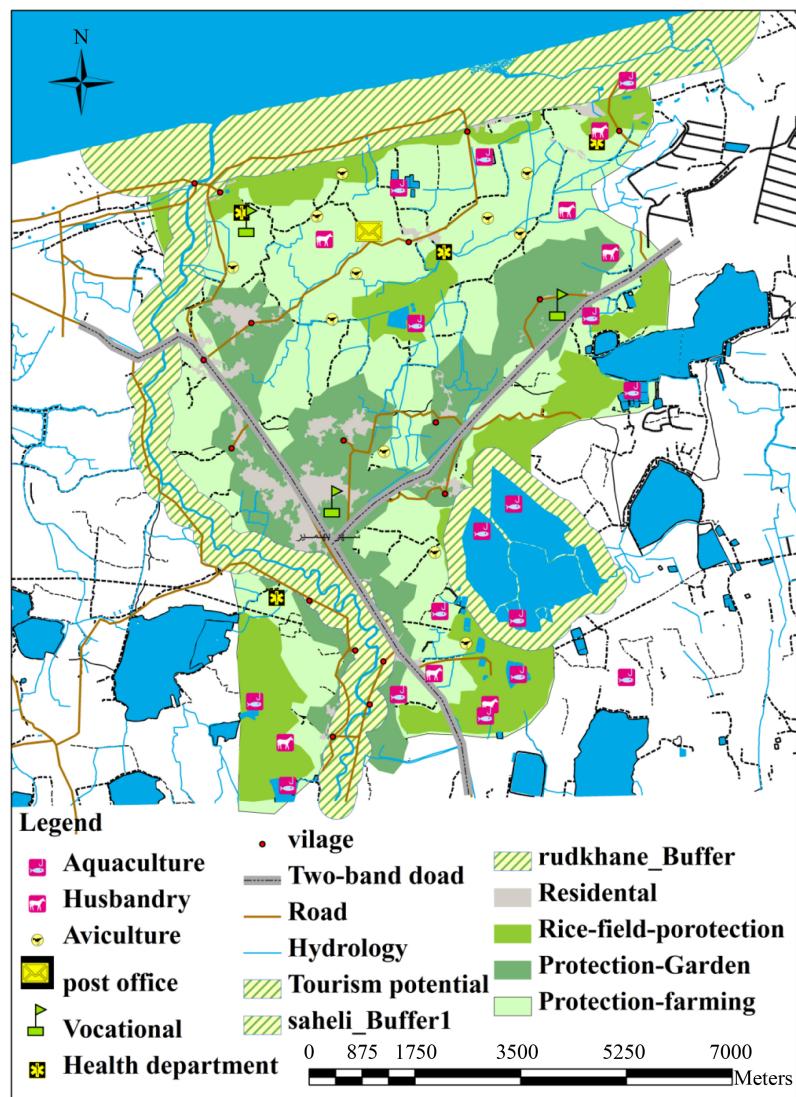


Figure 11. Physical-spatial plan (stating the solutions related to general goal).

of rural districts to surrounding cities to find job. It also helps residents of rural district meet their needs (Figure 11). Additionally, areas appropriate for culture of rice, gardening, and agriculture are recommended. This solution will also be used as a criterion to prevent constructions in these areas. It is recommended that a number of technical and vocational centers to be constructed in different areas with an approach of modern agricultural educations, equipping, and improving the educational and therapeutic centers, as job of majority of rural residents is agriculture. A number of healthcare centers and postal centers are also recommended for fairly distribution of facilities at the rural district level in different areas. However, it needs to state that the transformation of these solutions into executive solutions requires conducting continuous research in the next stages, which they were not included in domain of this research, because of some problems such as lack of adequate time. Other solutions are displayed in Table 4.

3. Discussion and Conclusions

Behnemarrural district has a plain and Caspian climatic position. Its lands are highly unrestricted in terms of agricultural indicators because of enjoying all geographical conditions. Most of these lands have been allocated to rice fields, while cereals, citrus trees, canebrakes, and coastal forests are also seen at the margin of the sea. This rural district has been developed in organized manner during the history. It has been developed with lowest environmental impacts. However, its development capability has been increased and many environmental problems have been emerged as result of increased population and trans-regional activities, natural areas for recreation and exporting the products to other areas.

Some of these problems include changing the land use from agriculture to construction, uncontrolled development of constructions at the margin of roads without considering the legal privacy of the roads, the unbalanced level of services and population growth, river flooding, the destruction of vegetation at the margin of the river, reduced soil productivity, loss of natural vision, soil erosion, and water resources contamination because of lack of wastewater treatment. It can be concluded that there is no organized plan to achieve sustainable development in this rural district. Thus, environmental planning was carried out in this research in the form of three stages of the planning process. These stages included recognizing the current status, analyzing, and integrating social, economic, and ecological developments of Bahnamirrural district. The plans are not supported and realized in practice since the plans are developed merely by using scientific and specialized methods without involvement of values and real needs of people. Accordingly, this research was carried out with the participation of local experts. The importance of this research is related to fact that decisions and development plans are developed at the national, provincial, and sometimes urban level, and then, they are used as the principles of development in urban and rural areas. It means that there is no means to plan at small scales (local) in Iran. Accordingly, this research can be a model to provide solutions at the local level (rural district). Given findings of current investigation, some recommendations (natural, socio-economic, and human-made environment) are provided as follows.

4. Natural Environment

- Implementing of operations related to river flooding control: Improving and protecting the vegetation at the margin of river, construction of soil walls, organizing and dredging of water channels and waterfalls, passing laws to limit the constructions in the privacy of river.
- Using ecological agriculture methods.
- Construction of a wastewater treatment system (urban, agricultural, industrial) and garbage collection system.

5. Socio-Economic

- Development of areas related to agricultural jobs (gardening, husbandry, aq-

uaculture, agriculture, farming, and so on.

- Development of industries related to agriculture and coastal tourism industry.
- Creating agricultural education centers.

6. Human-Made Environment

- Evaluating the potential of the area to create land uses in consistent with environmental conditions of area.
- Enhancing the quality and safety of current roads and increasing their status to standard levels and developing solutions for passing the agricultural machines.
- Protecting the coastal forests and local vegetation at the margin of river and waterfalls and protecting birds habitats.
- Implementing regional plan of “Coastal Tourism Sample” by observing environmental criteria.

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