Centre for Research on Settlements and Urbanism

Journal of Settlements and Spatial Planning

Journal homepage: http://jssp.reviste.ubbcluj.ro

The Eco-Village Concept in a Model Experiment in South-West Hungary

Bela BORSOS[1]

[1] *Pécs University of Sciences, Institute of Geography, Pécs, HUNGARY*
E-mail: dioliget@t-online.hu

Keywords: *eco-village, system theory, sustainable rural development, human ecology, Hungary*

ABSTRACT

One of the methods to face the challenges of the worldwide ecological crisis is the implementation of sustainable development principles at the rural development level. In South-West Hungary, the sparsely populated small village region of Zselic is the location of a small-scale sustainable settlement development project in the former abandoned village site of Gyűrűfű. Over the past twenty years, ecological design principles such as permaculture have guided the re-settlement of the area. Spatial planning was one of the dominant features of the design work with overlapping thematic maps and bioregional properties. This paper summarises the practical experiences gained from such a design concept.

1. INTRODUCTION

The eco-village concept is based on the principles of sustainable development and on the findings of ecology as the underlying discipline.

It focuses on the implementation of a human settlement pattern or model which can be smoothly integrated into the surrounding environment, therefore eco-villages come naturally in the most diverse and versatile forms, adapted to the local natural and social environment.

The site of the model experiment, the subject of this paper, lies in South-West Hungary, in Zselic region, in the former abandoned village Gyűrűfű.

The work focused onto the settlement geography and settlement development aspects of the multifaceted project and looks for answers to which extent the eco-village as a form of human settlement and spatial planning can be integrated into the Hungarian network of settlements under present conditions and to which extent it meets the requirements of sustainable rural development.

2. THEORY AND METHODOLOGY

2.1. Theoretical background

Many dealt with the issues of defining the concept of sustainable development [1], [2], [3], [4], [5], [6], [7], while an outline of the development issues in settlements is summarised in [8], [9], [10], [11]. Linking the two, the basics of a sustainable settlement development theory can be found in the work of Hajnal [6]. Utilisation – and not exploitation – of the wider geographical environment of a settlement on ecological grounds is the subject matter of bioregionalism [12], [13], [14], while the eco-village concept itself has been formulated several times and in many different ways [15], [16], [17]. Implemented examples on the ground can be found in many places and in a great diversity worldwide. Their international cooperation network is GEN (Global Eco-village Network). The forerunners of Gyűrűfű eco-village include mainly two projects, Village Homes, Davis, California, and Crystal Waters, Maleny, Australia.

In the light of what was said above, the main objective of the experiment was to *develop and implement a small scale sustainable settlement development model based on ecological principles*. During the development of the model, the following tasks were identified:

- to explore and to identify the relationship between the eco-village scheme and rural development patterns, the structure of Hungarian settlements and available natural conditions which all have to be taken into account during planning;

- to resolve as much as possible the contradiction and possible conflicts between the backward rural area and the intentional community, which, like a foreign body, is embedded in it (i.e. the eco-village);

- as an objective, to set up a possibly self-sustaining small settlement of approximately 300 people with the properties of communities, open to information and closed to the extent possible in terms of material flows.

2.2. Research methodology

The eco-village concept and design principles provide an excellent example to the overall spatial development aspects of human societies as formulated by geographical sciences. Any social organisation has its own physical, regional or local components. Consequently, a social development model will necessarily have organic connections with all the three major areas of the geographical sciences (physical geography, social geography and regional geography) being an interdisciplinary approach just like geography itself.

In the case of Gyűrűfű, neither the natural environment was identified, nor was the model pre-arranged. The first had to be searched for, the second developed. During the exploration phase, certain criteria were defined on the *regional* level in order to both manage and monitor the experiment to be made. The following considerations had to be regarded as the key factors deciding upon the final choice of location:

a). Appropriate distance from big cities in order to avoid the agglomeration effect.

b). Possibly not too expensive land in order to make reasonable financing feasible.

c). Independent, outstanding watershed and hillside landscape to provide physical limits to the site.

d). Few industries and traffic, to mitigate environmental effects.

e). Uninhabited yet habitable land, to avoid influences from extant infrastructure, settlement patterns and social relationships to the extent possible.

After a sporadic and random assessment in the Göcsej, the Zala, and in the Tolna hill range and in the Zselic, the choice fell on the current site because it complied with all the aforementioned conditions precedent and had a symbolic name (Gyűrűfű has become a symbol of small villages in Hungary abandoned during the seventies, falling victim to the state Socialist regime's spatial development fantasies). It consists of a drainage basin of approximately 1,100 hectares, with two south-facing hills in the middle and with forest covered waterlines around the surrounding higher hills. There is only one outflow from the area to the south where all surface waters discharge. The valleys on both sides of the central hills and the hills themselves were grazed by herds of sheep after the villagers left, the houses fell down, and water wells collapsed. The basic morphological features and the vegetation cover could be clearly seen on the surface contour map and on the vertical aerial photographs made in 1991 at the start of the design work (figure 1). The pastures and meadows in and around Gyűrűfű were in a highly developed stage of secondary succession. The theoretical concept had to reconcile two contradictory approaches – more efficient resource use / denser settlement pattern, and natural way of living / airy, spacious arrangements, respectively – and a vision presented which can be attractive for prospective settlers and, at the same time, translates as much as possible from the planning and design principles of sustainable settlements (such as negative feedback, development without growth, biological-ecological compatibility, and so on). General systems theory proved to be a useful intellectual background for such an endeavour. The considerations which guided the design process were discussed elsewhere [18].

The planning method applied was mainly derived from an ecological design system named *permaculture* [19], and its more advanced version suited best to the goals of the project [20], [21]. Although originally an alternative agricultural system (the term being coined from the words *perma*nent agri*culture*), permaculture in general can be used for designing rural spatial development schemes, focusing on *watershed based design, use of local materials and resources, low external input and extensive use of manual labour, amalgamation of old and new solutions as well as the establishment of local cycles*.

In broad terms, the design process followed the rural environmental planning methods developed by Sargent *et al.* [22], starting with the inventory of the resource base, protecting natural areas, keeping (in this case reclaiming) farmland, and planning for the drainage area (the river basin approach), including rural quality and positive social planning. However, when it came to practical implementation, American methods and examples were no longer relevant in Hungary. The first step of the actual design work was the acquirement of the surface-contour map of the experimental site and delineation of the watershed of the water catchment area. Fortunately this has mainly concurred with the administrative and hence, the design boundaries and a relatively uniform structure of ownership.

Fig. 1. Aerial photograph of the abandoned project site in 1991.

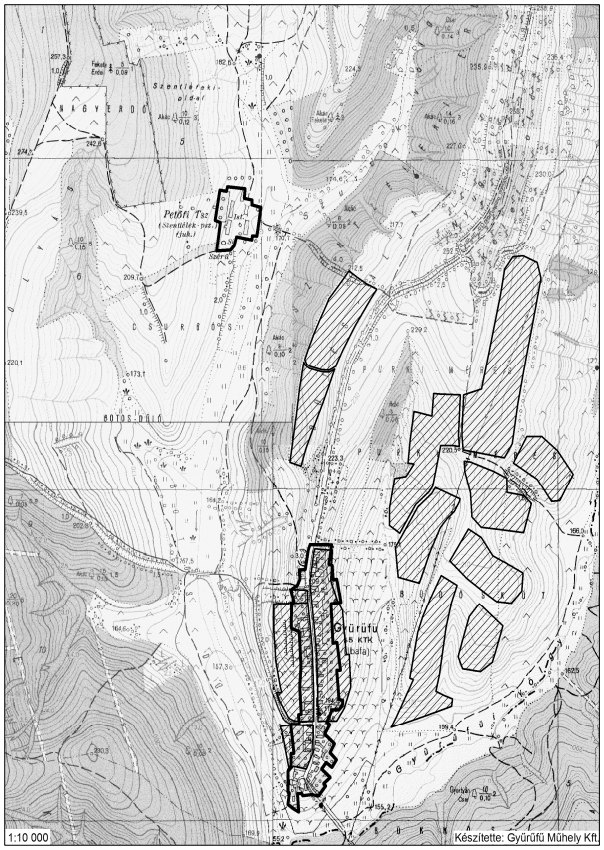

Fig. 2. Spatial planning scheme of the former village and the new design pattern *(dark contour: old settlement, striped areas: new design).*

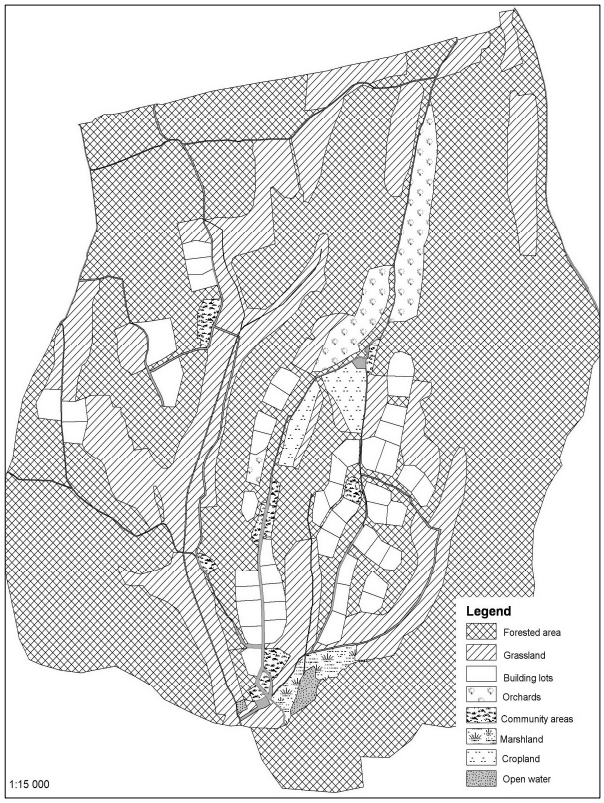

Fig. 3. Master plan of Gyűrűfű in 1995. *(Source: Pylon Ltd., Gyűrűfű Műhely Ltd).*

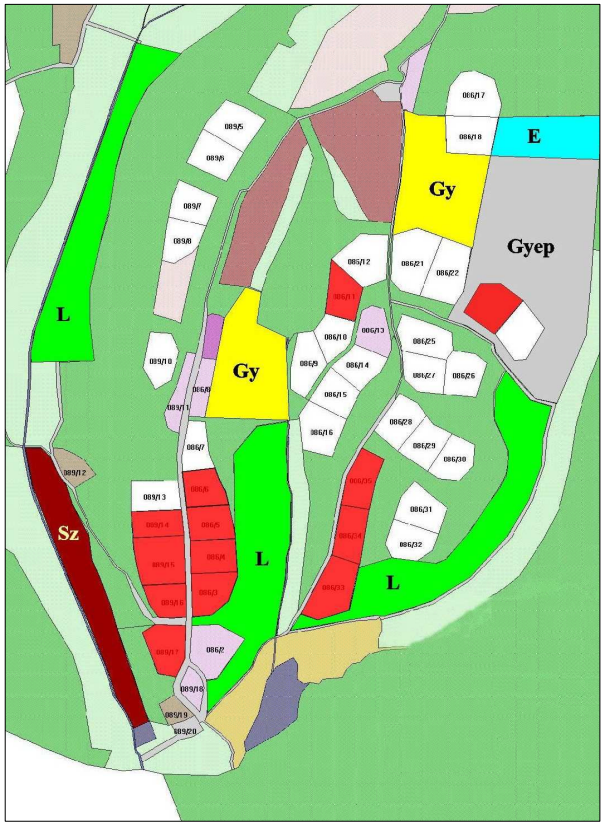

Fig. 4. Gyűrűfű as built in 2006. *(Colour code: red: built-up lots, white: empty lots, violet: community areas, L: pasture, Sz: cropland, E: newly planted forest, green: forest stands. Source: Gyűrűfű Műhely Ltd).*

During the next step, landscape assessment was made with the help of site visits and field work. In the Zselic hillside, the original biotic association would be predominantly a dense stand of Sessile Oak or Durmast Oak (*Quercus petraea*) mixed with hornbeam (*Carpinus betulus*).

However, because of century-long human presence, these woods have been transformed and, in many places, they are now replaced by formerly farmed land, mainly grassland and meadows, while on the bottom of the valleys there are unregulated water courses. Disturbed and abandoned areas are prone to secondary succession. The former village site is situated in the middle of the water catchment area, on the southern slope of a North-South ridge.

Based on the land assessment categories set up by Lóczy, D. and Gyenizse, P. [23], the Gyűrűfű area belongs to group four: *"erosion-derasion hill range in an elevation of 250 to 350 metres above see level, featuring clay-leached brown forest soil; remnants of oak woods with beech and hornbeam, partly under crop"* [24].

In the next step of planning, many aspects of the site were assessed in a series of feasibility studies: geology, hydrogeology and environmental geology, soil types, agro-ecological potential, farming possibilities under the permaculture system, application of permaculture as a design system at the level of a scattered, clustered village pattern, the state of forests, sustainable settlement design alternatives, water management and waste management concepts, as well as the existing and potential energy infrastructure.

Extensive research was carried out in relation to the farming, building, water management and social practices and other land use aspects of the former Gyűrűfű village. Exploration of the causes for abandonment suggests that the underlying political reasons of emigration were reinforced by the physical geographical situation in the middle of a hill-range, cut off from traffic routes.

In the middle of the 1990s, statutory enforcement of the ecological organising principles seemed to be best served by the preparation of a village master plan. Land use patterns outlined in the master plan were driven by the desire to reconcile ecological considerations with primary human needs. With the help of overlapping maps, designers tried to identify the sites most suitable for human settling (i.e. housing plots), in other words the focus was not so much on pre-existing social or infrastructural, much rather on natural environmental features (such as exposition, aspect, slope categories, inflexion points, forest cover, erosion risk, and so on).

Due to the natural indentation of the landscape, this resulted in a quite fragmented land use proposal, accompanied with exact requirements for construction methods, land and landscape use (fig. 2).

3. RESULTS AND DISCUSSION

3.1. Results

Project implementation was accomplished by an organisational framework consisting of a foundation, later of a civic association and a branch of the local authority, of various businesses and by land consolidation. The legal form of the foundation proved to be a quite unfortunate choice over time, because of changes in legislation and difficulties in organisation, while the landed property ownership has been hopelessly confused during the compensation process. Amendment of the Land Use Act in 2002 rendered the earlier concept of joint land use practices impossible. The legal complications of the project were summarised in one of my earlier papers [25]. The first version of the master plan was also getting out of date since it has become apparent that intensive forestation renders agricultural land use impossible and is therefore untenable. The function which was the key objective of the foundation upon incorporation (i.e. to raise funds for the project) became partly irrelevant and was partly raised to higher dimensions. Ensuring livelihood for dwellers in the village was and still is a great challenge. Moving in entails a radical change in lifestyle at any rate, which is sometimes reflected in the changes of the employment pattern.

Livelihood options are illustrated in the following summary (2006): number of housing units – 12; number of adult villagers – 23; qualified (university or college) – 12; other (skilled, trained worker, housewife, etc.) – 11; livelihood locally or dependant – 12; commuting – 11; white collar workers – 5; mixed – 2; blue collar workers – 16.

In spite of what was said above, Gyűrűfű took roots and has now a considerable impact on the parent village, Ibafa, as well. According to statistics, only Gyűrűfű is regarded in the outskirts as a *"dwelling place not associated with farming or other functions"*, while it had 26 inhabitants at the 2001 census. Since then, the number has grown (July 2012: 33 inhabitants).

The master plan was subsequently amended in 2006, in conjunction with the master plan of the neighbouring Ibafa as part of a mandatory review. In order to mark the ecological settlement development pattern, the local government in Ibafa community declared the entire watershed to be a nature reserve.

Infrastructure in the implemented project is different mainly in terms of its approaches from that of conventional settlements and the construction technologies applied, including solutions of building engineering, water supply, waste water disposal, heating, hot water, and of waste management. Energy supply was only one aspect of a very complex design challenge and therefore, because of the necessary

compromises, apparently not all solutions could be implemented, which otherwise from the technical or physical geographical perspective would have been feasible and desirable.

The most important thing to say is that no comprehensive plans were made to replace electricity needs, therefore no cost efficient and feasible alternative exists to the conventional power grid. At the same time, the mitigation of demand for electricity, the use of passive solar energy, integration of biomass energy in the system and energy saving were all basic objectives during the design phase [26].

The most important local construction material, the clayey loess soil of the surrounding region is most suitable for the building of rammed earth houses. The first building permits were issued for Gyűrűfű in 1996, with reed bed systems as the waste water treatment method. Since no standards were in place at the time, they were endorsed by the local medical officer on "experimental" grounds.

The main construction material beside rammed earth was sun-dried mud bricks, supplemented with a number of other "products" which can not be standardised and even less marketed, while after the water tests were completed, water supply was installed from freshly prepared dig out wells, cleaned old groundwater wells and rainwater collected from rooftops to meet domestic water supply needs [27].

Building engineering solutions included wood-fired individual heating systems such as cockle-stoves, lime-washed ovens, hot-air heating, domestic hot water generation based on stoves and solar thermal collectors as well as composting toilets. Organic farming is a requirement for all farmers on the territory and ecological principles are being enforced in forestry management as well.

The nature conservation management plan was completed for the area which provides the framework for the ways of farming and forestry within the watershed. The access road to the site was completed in two construction phases, connecting it to the national network of public roads. Also, information technology infrastructure was installed (both voice and data communication), which expands the livelihood options and allows for the use of telecommunication services. By 2012, this included a wireless terrestrial broadband connection system available to all inhabitants.

The success of the eco-village concept is demonstrated by the fact that during the First Hungarian Biodiversity Day organised jointly by the Hungarian Association of Ornithologists and the Gyűrűfű Association in 2006, 24 field scientists managed to identify more than estimated previously, a total of 1,656 multicellular organisms, animal, plant and fungi species over a 24 hour period in the Szentlélek-valley, on a mere one square kilometre sample plot. People living here have always made a point of demonstrating the model value of the village. In Spring 2007, the Szent László nature conservation trail was opened, providing an excellent summary of all things happening at Gyűrűfű with the help of an open air exhibition and a tracking path.

3.2. Discussion

Results and conclusions of the twenty years of work can be evaluated in many different ways:

1). The preferred design option, the spacious, airy arrangement with farm holdings was implemented, where, in addition to the use of environmentally conscious, material and energy saving methods, high tech solutions are also present, in particular in the field of communication and information technology.

2). During the past few years, serious progress was made in many sectors (building technology, water management, telecommunication, energy supply solutions, and farming), while in other fields development is stagnant (generic electricity supply, forestry management, traffic, education) and *social, legal,* and *sociological aspects* of the project are coming more and more to the forefront, which sometimes exceeds the framework of physical geography in the narrower sense.

3). Ecological building and construction technology, water supply, sewage treatment, gardening, agricultural methods developed and were successfully adapted to geographical conditions. At the same time, the project failed in reducing the role of mobility and traffic, phasing out commuting, and in implementing a large part of the forestry management concept. No viable, renewable based alternative could be found to replace electricity from the grid. Retrospectively, the organisational framework around a foundation must be deemed erroneous and the concept of unified common land ownership futile.

4). Since the start of the project, the system of external boundary conditions has been changed extensively, not only in terms of legal and regulatory aspects, but in many other ways, ranging from international politics to technological development. Examples include the building permit licensing procedure and the ISDN communication lines now replaced with wireless ADSL.

5). Due to the diminishing interest and eagerness to act on behalf of society at large, worsening economic situation and standard of living, as well as the changing legislation, the settling of newcomers has become more and more difficult in spite of the fact that, from the objective point of view, the now existing infrastructure could facilitate such a move. The architecture of the new settlement does not really fit the dominant settlement development patterns of the 21st century, because present trends continue to favour the

generation of large agglomerates and the depopulation of the countryside.

6). The predominant policies and the business sector do not support teleworking, the creation of small, self-sustaining farming operations or the establishment of small independent enterprises. People need to have very serious human resources, perseverance, diverse qualifications and wide ranging experiences if they want to secure a standard of living and quality of life meeting the requirements of human dignity for their families in a settlement environment like the one at Gyűrűfű.

7). Instead of independence, the only possibility in public administration is to set up and operate a branch of the Ibafa local council. The Municipality Act, related legislation and political will prefer recentralisation in terms of employment, public education, health care, and governmental administration.

8). A settlement and rural development policy claiming to be ecologically and economically sustainable must offer alternative livelihood solutions for those living in the countryside. The reformation of the Common Agricultural Policy of the European Union and the rural development strategies provide an excellent foundation to build on (at least in theory), while the design principles of the eco-village fit perfectly the European Union concept, since the strategic objectives set for the new rural development concepts and the settlement pattern implemented in Gyűrűfű concur.

9). Unfortunately, reconciliation of rural development and agricultural strategies with the needs of land use in the interest of nature conservation and ecology, with the help of the so-called multifunctional agrarian model (in Hungary under the National Agricultural Environmental Protection Programme), was made in vain, as other social factors such as employment, traffic patterns, social web, communication infrastructure, lacking political will and the behavioural patterns wide spread amongst the youth do not produce enough glue to retain people in rural environments.

The New Hungary Rural Development Strategic Plan argues consistently for the intensive agrarian model, in other words, even the present results achieved so far will be jeopardised. An eco-village is an artificially created formation, not the result of organic social mobility; therefore it is not very probable that it could play any decisive role in changes of the settlement portfolio in addition to the examples of practical land use and settlement layout. In other words, it is highly unlikely that the majority of the existing small villages in the countryside would turn to eco-village overnight, or that considerable numbers of the currently urban population would migrate to eco-villages. The features described above in detail can be systematised with the help of the SWOT analysis, known from the international literature (strengths and weaknesses, opportunities and threats) as follows:

Table 1. SWOT analysis.

Strength	**Weaknesses**
– concept, design, post industrialist dual model (ecotech + high tech) – building technology, water management, waste management, passive solar energy, agriculture – flexibility, adaptability – transfer of experiences – local government – natural lifestyle – community life (housing and working community)	– organisational structure, ownership pattern (foundation) – electricity, forestry, traffic (commuting, road quality), education, supplies – social, sociological basics, cohesion, community life (joining together) – integration into the settlement network – scattered spatial pattern, fragmented land use
Opportunities	**Threats**
– acquisition of landed property – rural development policy (if appropriate) – fame and recognition – infrastructure developed – common agrarian policy, CAP (in principle) – telecommunication – accumulated experiences – integration into the settlement network	– social disintegration, poor maintenance (road, community building) – lacking social needs, interest – overall economic situation – legal changes, recentralisation – rural development policy (if inappropriate) – common agrarian policy, CAP (in practice) – changes in external conditions

Much is at stake on the legislative background. In this respect, the following would be needed:

- *deregulation*, make more simple rules and legal provisions;

- *devolution,* localise rules;

- *economy of scale* in regulation, different requirements for small and major communities;

- *less rigid administrative structures,* to allow site specific solutions and participatory management.

So far, only a vague attempt has been made to measure the sustainability of the eco-village by political,

environmental, ecological, social and economic indicators. The outcome shows a difference from a conventional Hungarian community. Unfortunately, in the absence of a control experiment, these data can only be endorsed with reservations as anecdotic. The evaluation was based on approximate estimates and no actual measurements were carried out.

The values obtained by a mixture of interviews and available hard data were plotted on an imaginary scale of 100.

Based on this sketchy picture, sustainability at Gyűrűfű shows social-political future to be most doubtful, while economic sustainability is reduced dramatically due to a number of external impacts (upon evaluation of the individual score, a weighing factor was used). Not surprisingly, best scores were given to the ecological and environmental aspects.

4. CONCLUSION

In summary, we can conclude that – as it is usual with living systems – *stability and variability* are present simultaneously in the development patterns of a community which focuses on ecological principles of organisation.

The viability of the project is demonstrated by the adequate responses given so far to all the challenges encountered and the ability to change whilst preserving its original ecological features to the extent possible.

At the same time, maybe it is not an exaggeration to say that *Gyűrűfű has grasped a historical opportunity after the political transition of 1990, it was organised in a time window, which has since been closed.*

No other experiment is made these days in Hungary which would be based on a similarly comprehensive concept and the fundamental principles and experiences of ecological settlement development formulated and obtained at Gyűrűfű. Potential and actual impact of changing legislation, the accession to the EU, the effects of standardisation and centralisation tendencies enforced through administration and legal provisions make diverse, unorthodox, and site-specific spatial design models more and more difficult to implement. In spite of the promises of the nineties, complicated and unreasonable bureaucratic expectations are to be met.

On the other hand, the possibilities to involve stakeholders in settlement and regional planning must be exploited to the extent possible [28].

In an effort to adapt to changing conditions, expected changes in land prices and land use patterns, as well as land consolidation need to be monitored, and the financing possibilities offered by the central redistribution mechanisms should be exploited (e.g. EU subsidies, regional operative programmes, national development plan, and structural and cohesion funds).

In terms of spatial development, the following key issues need to be tackled in the future:

- application of sustainability indicators to demonstrate the results at Gyűrűfű. Development of a relevant methodology adapted to a small scale, yet providing quantitative outputs. Completion of appropriate control measurements;
- further development of the village and the setting up of a compact unit. In its current form, one of the key ideas of the eco-village concept is not implemented: cooperation of co-existing sub-units is missing, and you can see a certain disintegration and inconsistent use of space;
- a flexible and transparent, functionally appropriate organisation structure must be set up, separately for land management, community and social functions, fund raising activities, and administrative tasks;
- final and reassuring consolidation of landed property and ownership rights. This is an indispensable prerequisite for long term balanced land use, in particular concerning the currently unused areas in various stages of secondary succession and forestation;
- solutions to components stressed in the original concept, but implemented less successfully: energy supply, in particular the choice of electricity sources, reduction of mobility needs, advancement of the waste management concept, plans to use currently unused land, launching watershed based water management in the area, larger scale projects like swales, water catchment ponds);
- strengthening international cooperation, development of the Hungarian and English web site and publications.

Maybe it can be stated with confidence that the eco-village, as one of the sustainable settlement models, will once take its place in the ever changing pattern of the network created by the Hungarian settlements.

The spatial planning model applied proved to be feasible and manageable with all of its deficiencies. In spite of difficulties, there is no reason why eco-villages as such could not become a viable and liveable, long term sustainable form of settlement, enriching the Hungarian landscape.

5. ACKNOWLEDGEMENTS

The author is indebted to all the people who have participated in or contributed to the experiment which provided the subject matter for this paper, advisors, scientists, experts, designers, certain helpful civil servants of certain authorities, project team members, manual labourers, inhabitants of the surrounding villages and former villagers of Gyűrűfű. Also, the publication is a tribute to the late Prof. Dr. József Tóth, former Head of Institute of Geography, University of Pécs, Hungary, without whose support and sound criticism this work could never have been completed.

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