INTEGRATED AND PARTICIPATORY LAND-USE MANAGEMENT

THE IMPLEMENTATION OF INTEGRATED LAND CONSOLIDATIONS IN THE CONTEXT OF THE 3RD RIVER RHONE TRAINING PROJECT IN THE CANTON OF VALAIS, SWITZERLAND.

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ZUSAMMENFASSUNG

Das Konzept der 3. Rhonekorrektion (R3) beinhaltet u.a. markante und über den gesamten Streckenverlauf von 160 km verteilte Flussraumaufweitungen. Die damit äusserst wichtige räumlichen Einbindung der R3 in den dicht genutzten und besiedelten Talboden das Kantons Wallis erfolgt über einen integrierten und partizipativ gestalteten Planungsansatz, der drei Ebenen miteinander verknüpft: 1. Die Projektebene R3 mit den ausgearbeitet Varianten. 2. Die von der R3 initiierten Regionalen Entwicklungskonzepte, welche den generellen raumplanerischen und regionalökonomischen Rahmen aufzeichnen. 3. Die Integralmeliorationen als ebenfalls partizipativ organisiertes Landneuordnungsverfahren, mit dem insbesondere im ländlichen Raumes bis auf die Ebene des Grundeigentums sowohl die für die R3 notwendigen Flächen sichergestellt sowie gleichzeitig als Kompensation des Flächenverlustes die landwirtschaftlichen und kommunalen Infrastrukturen verbessert und die ökologische Qualität der Landschaft aufgewertet werden. Der integrale Ansatz verlangt jedoch von den Regionen und v.a. den Kommunen eine aktive Raumentwicklung. Soll das Angebot der R3 als Chance aufgenommen und die räumliche Einbindung ohne Enteignungen realisiert werden, braucht es insbesondere für das Umsetzungsinstrument der Integralmeliorationen von den Kommunen und weiteren Interessengruppen eine direkte Unterstützung.

Keywords: Integraler Planungsansatz, Land Management, Regionale Entwicklung, Integralmeliorationen, Partizipation, Hochwasserschutz.

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ABSTRACT

The concept of the 3rd River Rhone Training Project (R3) includes a series of distinct riverbed enlargements along the entire project length of 160 km. To achieve the crucial spatial integration into the densely occupied river plain, an integrated and participatory planning and land management process has been initiated, combining three levels: 1. The project level with the variants; 2. The Regional Development Concepts initiated by R3; 3. The Integrated Land Consolidations (ILCs), representing the implementation tool to reorganize in particular the rural territory down to the property level, taking into account the allocation of the necessary surfaces for the R3 and in parallel the improvement of the agricultural and communal infrastructure as well as the ecological revitalization of the landscape - both as a compensation for the surface losses caused by R3. However, the integrated planning and implementation process requires an active territorial development policy from the regions and in particular from the communities. In order to perceive the R3 as an opportunity for the development of the rural and peri-urban territory without expropriations, further ILCs will need strong support from the communities and stakeholders concerned.

Keywords: Integrated planning and land management process, regional development, integrated land consolidation, participation, flood control.

THE RIVER RHONE: SUSTAINABLE FLOOD CONTROL REQUIRES MORE SPACE FOR THE RIVER SYSTEM

Both economic activities and ecological systems are always related to land and land-use. In terms of economic activities, increasing demand for land is often spatially concentrated in the large river plains and near agglomerations. Traffic, housing, consumption, tourism and recreation, industries, infrastructures for material disposal, energy production and energy supply create heavy pressure on open space, in particular on rural areas adjacent to fast growing peri-urban zones. At the same time, nature and landscape protection are legally undisputed elements of communal and regional development. In addition, the protection of agricultural land has become a sensitive and important issue, since today agricultural practices follow ecological rules and have also taken on a relevant role in maintaining and cultivating open landscapes and natural sites. However, ecological and agricultural systems depend on sufficient and suitable surfaces of land. In summary, this leads to a high spatial density of contradictory land-use types and demands with often conflicting interactions. This becomes particularly obvious where the economic and technical infrastructures are increasingly exposed to natural hazards such as floods. The numerous floods of the past decade have highlighted how closely the vulnerability of our economy is related to the lost space for our river systems. The situation becomes even more critical since with the ongoing climatic changes, floods may increase in terms of extent and frequency.

As a result, the Swiss federal and cantonal laws require that integrated river training and flood control concepts be implemented. This means that hydraulic engineering has to be combined with improving the river morphology and the ecological connectivity of a river system. Flood safety has in the first place to be assured by river maintenance and spatial planning. The effects of those measures have to be assessed in a holistic way, considering the interactions with all other relevant issues.

This integrated approach is currently being applied to the realisation of the 3rd River Rhone Training Project (R3[5]) in the Canton of Valais, Switzerland. With a length of 160 km. and an investment of approximately 800 million Euros, the project represents one of the largest river training projects at present in Europe. In applying an integrated approach the challenge is not only to guarantee flood safety, but also to integrate the river in the entire river plain, considering all interests, such as communal and regional development, environmental conservation, agriculture sustainability, leisure, tourist and traffic infrastructure, and economic promotion. One of the key elements of the project is the enlargement of the riverbed along a series of selected sections. This requires land in peri-urban and intensive farming contexts, the only zones in the densely populated river plain, where enlargements are possible. However, 80% of the economic life of the Canton is concentrated in the river plain, which additionally increases the land-use pressure on open space.

INTEGRATED LAND MANAGEMENT - THE KEY INSTRUMENT FOR ALLOCATING AND COORDINATING LAND-USE DEMANDS

In order to provide the necessary space for the riverbed enlargements, rearward flood dikes, the ecological connectivity and the residual flood risk surfaces, an integrated planning and land management approach has been developed, combining different planning and implementation instruments and a top-down with a bottom-up approach. This allows a connection to be established between different planning and decision making levels, starting from the general master plan of the project, reaching finally the important property level, where specific surfaces need to be reallocated for either the River Rhone Project itself or for other land use purposes. Overall the entire planning and land management approach includes 3 levels (see also figure 5 at the end):

1. The project level - the Sectoral Plan for the 3rd River Rhone Training:

The sectoral plan is a territorial management tool and a base line element of the cantonal master plan (Canton of Valais, 2005). On a scale of 1:25'000 it includes the potential flood risk areas (hazard index map), the so-called "River Rhone Zone" adjacent to the main riverbed, and all relevant relations and conflicts with the associated territories. The hazards index map indicates the extent of a potential 100-year flood, affecting a surface of 11'000 ha in the Canton of Valais and another 3'000 ha in the Canton of Vaud with two degrees of intensity (high or medium to low). The definition of those flood risk areas considers also current land-occupation and follows the principle of appropriate and rational land-use. Finally, an area twice as wide as the current riverbed has been assigned along the riverbanks where no major obstacles or spatial limitations, such as residential and industrial zones or other infrastructure facilities, already exist. Along the entire 160 km river section in the Canton of Valais, the River Rhone Zone will be extended over 1'100 ha in addition to the current existing river zone of 1'300 ha. Within this zone no buildings are allowed. Thus the enlargements are an indispensable element towards realizing the hydraulic and river-morphological concept and to match the expected flood protection level (see also Arborino, 2008). The spatial definition specifically refers to the three main objectives of the project (Canton of Valais, 2000):

(i) Reinstallation and guarantee of flood security,
(ii) Improvement of the river's environmental quality, and
(iii) Use of the R3 for initiating a sustainable spatial development of the entire river plain.

[5] Used as abbreviation for the rest of the paper.

2. The regional level - the Regional Development Concepts (RDC) and the agricultural development strategy:

Having a distinct impact on the territory, the R3 requires a comprehensive integration into the present and future land-use patterns. The project has therefore established 6 regional committees, corresponding to the socio-economic regions of the canton. Their main task is to develop a long-term vision of the general development frame for the entire river plain. In the course of a strong participatory driven process, each committee, including the representatives of the local municipalities and further representatives from agriculture, local industries and tourism, has jointly developed a **Regional Development Concept**. It takes into account not only the economic, social and environmental demands and needs expressed by the different stakeholders but also considers the possible synergies or conflicts with the R3 in relation to the infrastructure and land use patterns of the river plain.

In this context agriculture plays a crucial role becoming a particularly important partner of the R3. On the one hand mainly agricultural land is required to realise the enlargements, i.e. the concept to reassure flood safety. On the other hand the agricultural sector has to undergo major structural changes in order to cope with the new challenges and demands of liberalised markets. The Swiss agricultural policy for the years 2008-2011 continues with structural reforms, meaning fewer subsidies for products but more direct payments for ecological services and more market exposure. To deal with those challenges an **Agricultural Strategy** (Canton of Valais, 2005) has been worked out, with active participation of the farmers, the chamber of agriculture and the cantonal agricultural service.

3. The property level - the application of integrated land consolidations (ILC) and the evaluation of potential ILC perimeters:

The third level concerns the land property itself and is an indispensable element of the integrated land use management approach. Land consolidations are a legally well-established land management tool and procedure to reallocate and rearrange rural property, mainly in order to reduce land fragmentation, along with improving the agricultural infrastructure but also to efficiently assure surfaces for highways, railways or other infrastructure projects of high public interest. However, over the past decade land consolidations in Switzerland have drastically changed their character and scope. Today they are integrated, multi-component, multi-purpose land management projects with strong stakeholder participation, taking equally into account agricultural, ecological and public-private interests.

This double functionality - the legally effective allocation of property and its extended scope as integrated territorial land management projects - are the main reason for applying ILCs as the preferred land management tool for integrating the R3 into the rural territory.

After all ILCs also make it possible to realise the jointly agreed compensation principle, which marks the base line of the partnership between R3 and the farmers: the loss of agricultural land due to riverbed enlargements, ecological compensations or rearward flood dikes will be compensated with the improvement of the rural infrastructure and land-use patterns taking also into account the conflicts between farming and other activities such as urban spread, tourism and leisure, or landscape protection. The overall objective is to improve the farmer's position to produce high quality goods under competitive economic conditions, despite the loss of agricultural land.

In the case of the R3 River Training Programme three ILCs were first prepared between 2005 and 2007 in the context of the two priority sections, where urgent flood protection measures and enlargements have to be realised first, starting in 2008 (Hersberger, 2008). In all three

cases the ILCs followed an approach combining a project preparation with a project evaluation and a participatory approach (see figure 1 below):

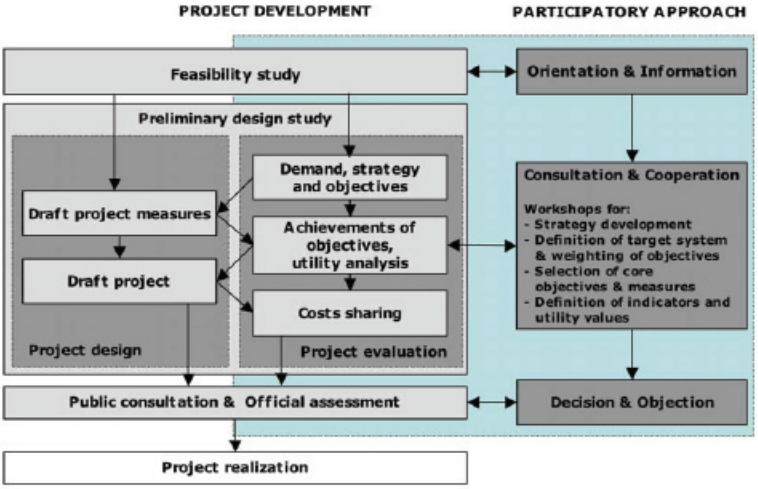

Fig. 1: Planning and project development procedure of ILCs

The project development and participatory approach include the following elements (Canton of Valais, 2005-2006):

- A feasibility study analysing the initial situation and conditions, the needs of the stakeholders, and the technical feasibility.

Fig. 2: Farmers and representatives from the cantonal agricultural service during one of the workshops for strategy development.

- A strong stakeholder participation throughout the entire project development process. Stakeholders were considered as groups of interest or individual representatives from governmental services and organizations, who have not only a general public and/or private interest in the territory but who are also affected by the project (Van der Werff, P., 2000).
- In the case of the three ILCs the following groups of interest were identified and invited to participate: farmers, non-agricultural land-owners, representatives from communal and cantonal authorities, representatives from tourist associations and NGO's in the field of nature protection (see also figure 2).

- A clear distinction of the four levels of participation (Bischoff, Selle, & Sinning, 2001): 1. Orientation and information on a general level for all persons interested, 2. Consultation & cooperation, which includes the active participation of the selected interest groups and 3. Decision & objection, which is limited to the landowners and authorities, since ILC procedures require the agreement of the landowners located in the ILC perimeter.
- A jointly elaborated definition of a sustainable development strategy for the rural territory.
- A translation of the strategy into a systematic, symmetrical and hierarchical target system with three equally valuable main objectives for *agriculture*, *ecology* and *public-private interests*. Each main objective was again subdivided into three further intermediate goals, each again subdivided into three sub-goals. This led to a comprehensive set of 27, i.e. 9 project objectives for each of the three main objectives.
- A prioritisation of the entire target system by the groups of interest.
- An assessment of the expected impacts and benefits of the planned measures by applying a utility analysis based on mainly spatially referenced indicators using GIS (Fritsch, 2004).

The process is completed by a public consultation among all communities and landowners involved and an official assessment among the cantonal and federal services. Based on the outcome, the ILC project becomes adjusted and then officially endorsed by the cantonal council, which then makes it possible to proceed with the implementation of the project.

Since the three ILCs prepared so far cover only the R3 priority sections, the rural territory along the remaining sections has been evaluated, using a set of nine indicators, based on the above-mentioned target system: *Agricultural infrastructure; land property structures; agricultural area in use; water bodies and aquatic environment; ecological networks, leisure, sport & tourism, traffic & mobility, communal development*.

The aim of this evaluation was to identify potential ILC perimeters, based on the demand of the rural territory in relation to the thematic fields of the nine indicators. The results demonstrate the potential for improvement, which can be achieved by an ILC independently from the River Rhone Project. This makes it possible to identify synergies between the R3 and the rural territory, e.g. in cases of significant riverbed enlargements and a high demand for a reorganization and improvement of the affected rural zone.

FIRST RESULTS AND EXPERIENCES

The regional level and the partnership with R3 for the agricultural development:

The results of the RDCs are presented in the form of maps (see below figure 3) and action sheets completed by an analysis of the potential instruments for implementation. The summary and synthesis of these concepts form an essential basis on which the final variant of the R3 will be finalised and spatially integrated. Although the RDCs are not legally binding, the municipalities and stakeholders have realised their importance in relation to the expected numerous land use changes in the densely occupied river plain, for which the River Rhone Project will be responsible only to a limited extent. Particularly in the upper part of the Valais, the ongoing construction of a new highway, the crossing of the new transalpine high-speed railway line, the extension of the existing railway lines and finally numerous intended extensions of communal residential and industrial zones during the next 10 to 15 years made it clear that the R3 is by far not the only land-demanding project. Downstream of the town of Visp, where the first priority measures will be implemented in 2008, the riverbed will be enlarged along two stretches, each of 1 km length (actual width +50%) claiming 8 ha of land out of which 4 ha. are cultivated (Hersberger, 2008). However all other present and future

neighbouring land demands amount to approximately 90 ha. in the adjacent river plain section of totally 365 ha.

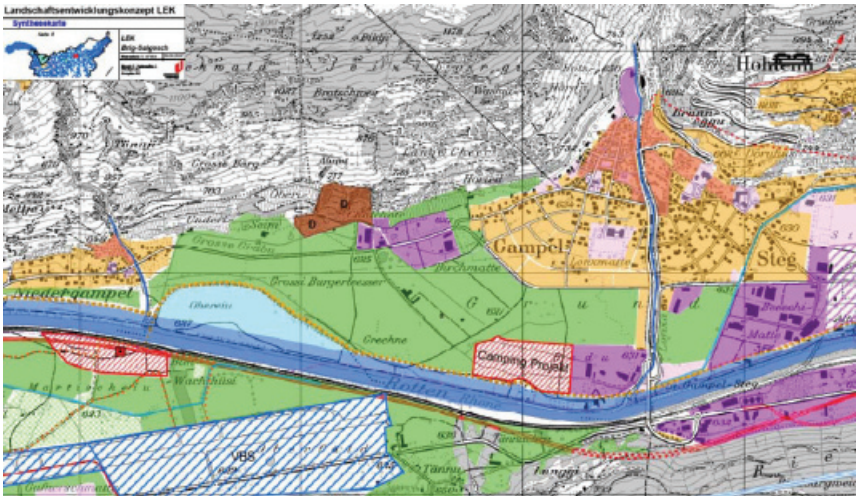

Fig. 3: Example of an RDC map, showing the main territorial demands and projects on regional level

These highly dynamic land use changes and the resulting high pressure on agricultural land once more emphasised the partnership between the R3 and the farmers. On the agricultural side the discussions with the farmers made it clear that there is an urgent need to act and reform agricultural structures - independently from any river training or other infrastructure project. The agricultural strategy report points out that not only the number of farms will decrease, but that the remaining farms can only survive if they produce high quality local specialities for niche markets. This means focussing on labelled products, which have a strong identification with the corresponding socio-economic region.

The application of Integrated Land Consolidations as implementing instrument on the property level:

Today out of the three ILCs, one project is about to implemented, one project is still in the course of legal procedures and one is still at the stage of a design project. Despite the different project status, it can be concluded that the instrument has proved to be efficient and well adapted to the purpose:

- The land demands for R3 can be fulfilled without expropriation;
- The land losses can be equally shared between all land owners;
- In return the agricultural land use patterns and infrastructure will be improved and adapted taking into account the activities of the municipalities, the economic development and the region, other infrastructure projects and the implementation of an ecological network. In the case of the three ILCs this means a total investment volume of approximately €22.3 millions, shared between the Federal Office of Agriculture, the River Rhone Project (financed through the Hazard Prevention Division of the Federal Office for the

Environment), the Canton of Valais, the communities concerned and the individual landowners, who usually have to pay only a minor share.

The results are three preliminary design studies, approved by the Cantonal and Federal Agricultural Services and published for a public consultation and assessment.

Fig. 4: Part of the ILC perimeter West of Visp, with the right-bank riverbed enlargements.

The participatory process and the project evaluation, in particular the close combination of the project design and the utility analysis, generated not only essential inputs for the technical solutions but moreover improved the perception and acceptance of the project among the communities, governmental services and landowners as deciders, as well as among all other groups with particular land-use related interests:

- The differentiation of various levels of participation (orientation & information – consultation & cooperation – decision & objection) not only made the participatory process more transparent, but also distinguished between interest groups and actors in the sense of deciders.
- However, the most critical element is the identification of the interest groups. This becomes evident while analysing the position of the farmers. On the one hand farmers are the main actors in the rural territory while cultivating land and maintaining the ecological quality of the landscape. On the other hand, in the case of the R3 they represent only a minority in terms of landowners, since most of their cultivated land is leased. This leads to conflicts with the farmers, who often felt overruled by non-agricultural interests and in consequence overestimated the impact of the surface demand for the river enlargements.
- In this context, the ILC procedure was able to create transparency related to the different and conflicting land-use demands as well as to raise awareness among non-agricultural landowners for an intact landscape, where agriculture has to play a key role.
- The target system became an important and indispensable element in the entire project development process. It represents the full range of the sphere of activities and the symmetrical structure made it possible for all interest groups and actors to agree on the equivalence of the three main domains of an ILC, i.e. *agriculture*, *ecology* and *public-private interests*. In fact this equivalence was never questioned and thus became the main basis for conflict resolution and balancing out the various interests.
- The weighting of the objectives is one of the most important steps and results of the participatory process, since all interest groups and actors are confronted simultaneously with the full range of project objectives and are asked to take a position while expressing

their priorities. The feedbacks were throughout positive and all groups showed high interest in participating.

- The application of two weighting methods is an important element for cross-checking the consistency of the weighting results. The first method is based on the analytical hierarchy process (Saaty, 1990, cited in Scholz & Tietje, 2002), and asks the participants to distribute their preferences among three objectives on each level of the target system[6]. This weighing method leads to a more strategic weighting, since the participants always have to express a relative preference among three objectives. The other method uses the classic swinging weights, where numbers between 0 and 100 are distributed to only the 27 detailed project objectives, listed in a random order. In practical use the two methods were called the "relative and the absolute weighting" and proved to serve as simple, robust and practical evaluation tools.
- The comparison of the results makes it evident that the profile of interest for each group appears in a much more distinct way when applying the relative weighting. This makes it possible to identify and confirm the core interest of each group. In contrast, the absolute weighting gives the participants more freedom to express their preference independently for each of the 27 objectives. The experience showed that the comparison of the two weighting results revealed mutual interests for groups with different and conflicting core interest profiles[7].
- The weighting results were presented in two different ways, either by the ranking of the weights per interest group or by the preference ranking for all groups per objective. A further result is the overall ranking of the 27 project objectives for all participating groups, based on the arithmetic mean of all group results. The highest ranked objectives were considered as core objectives. In general the nine best-ranked objectives were considered as core project objectives.
- The target system and the results of the weighting are also used to define indicators and utility functions for a utility analysis. The aim of the indicator definition is not only to evaluate the effect of the drafted measures, but also to involve the stakeholders in the planning process. Defining a utility function requires also agreeing on the maximum to be achieved and the minimum to be tolerated by implementing a certain measure. Thus the utility analysis made it possible to discuss with the stakeholders the range of project performance and to assess both the effect and the efficacy of the ILC in relation to the nine core project objectives. For the decision-making process the analysis was applied for two scenarios: The realization of the R3 in combination with or without an ILC. The results made it clear that the ILC will lead to a much better achievement for all core objectives.
- The results of the utility analysis have also been partly used to establish a cost-sharing key, which provides a negotiation basis for the communal, cantonal and federal services to agree on their shares.

Finally the complementary evaluation of the rural territory confirmed a rather high demand for further potential ILC perimeters, independently from the impacts of the River Rhone Project. As a preliminary result, overall 10 potential ILCs with high priority, two ILCs with lower priority and three high priority ILCs with a focus on peri-urban and industrial zones

6 Example: Distribution of 100 points among the three main goals, followed by a distribution of 100 points among the three intermediate goals belonging to each of the three main goals and finally distribution of 100 points among the three detailed project goals belonging to each of the nine intermediate goals.

7 Example: Across the absolute weighting farmers often marked their interest in ecological objectives, whereas the representatives of NGOs in the field of nature protection expressed an interest in agricultural objectives.

have been identified. In addition the evaluation revealed also two perimeters where the territorial reorganisation would be implemented more efficiently across an integrated community project, where the focus is more on zoning and spatial planning. Finally two perimeters would require a regional development project on a larger territorial scale.

CONLUSIONS

- The RDCs reflect the high dynamics of ongoing and intended land-use changes in the densely occupied river plain. However, the first experiences have shown that the extent of land-use demands for the enlargements need to be qualified in perspective with the considerable demands for industrial and communal development, which are often much higher and less coordinated.
- Therefore R3 does not remain in the role of simply another land-demanding large-scale project. With its integrated and participatory land-use management approach it offers a coordination function. However, it cannot take over the role of a territorial project as such. The R3 still has to be seen in the first place as a river training project, responsible for re-establishing flood safety, managing residual risks and improving the ecological and morphological functionality of the River Rhone.
- Relating to the agricultural and rural development, the decisive production factor is not the farming surface area as such, but much more the availability of adequate and up to-date farming equipment, production facilities and rural infrastructure. Consequently the latter calls for reorganising land-use and property structures as well as leaseholds.
- In this context the R3 project offers a unique opportunity in particular to the communities, to rearrange and optimise their territory, might it be urban, peri-urban or rural. This included the launching and financial support of the Regional Development Concept as well as the co-financing of ILCs as the tool for implementing the compensation principle "Surfaces for river enlargements against improvement of rural infrastructure". Implementing an ILC means also avoiding expropriations and activating the concrete perspective and opportunity for substantial investments in rural and peri-urban infrastructure.
- The results of the various utility analyses in the context of the three ILCs demonstrated clearly their multifunctional effect and the added value generated for the different private and public groups of interest and actors. Their implementation does not only make possible the management and coordination of multiple interests on the economic, social and environmental levels, but also realises spatial planning objectives on a concrete land-use and land-ownership level.
- The participatory process also revealed a number of critical points, such as its high complexity. Practical experience has shown that weighting across a target system with three levels and a total of 27 project objectives is still feasible. However, it requires the full support of the participants during the weighting process.
- A further difficulty is the representativeness, motivation and the regularity of participation. It has to be pointed out that ILCs are not applied automatically, although a series of further potential ILC projects with high improvement potential have been identified. The launching of an ILC requires active support especially from the communities. In the course of the three ongoing ILCs most of the communities supported the project. However a minority rejected the idea. In order not to block the territorial integration of the R3 and to avoid unnecessary exploitations, the Canton of Valais has the legal right to decree an ILC.

However, the cantonal authorities will only do so if the majority of the communities express their active and also financial support for an ILC.

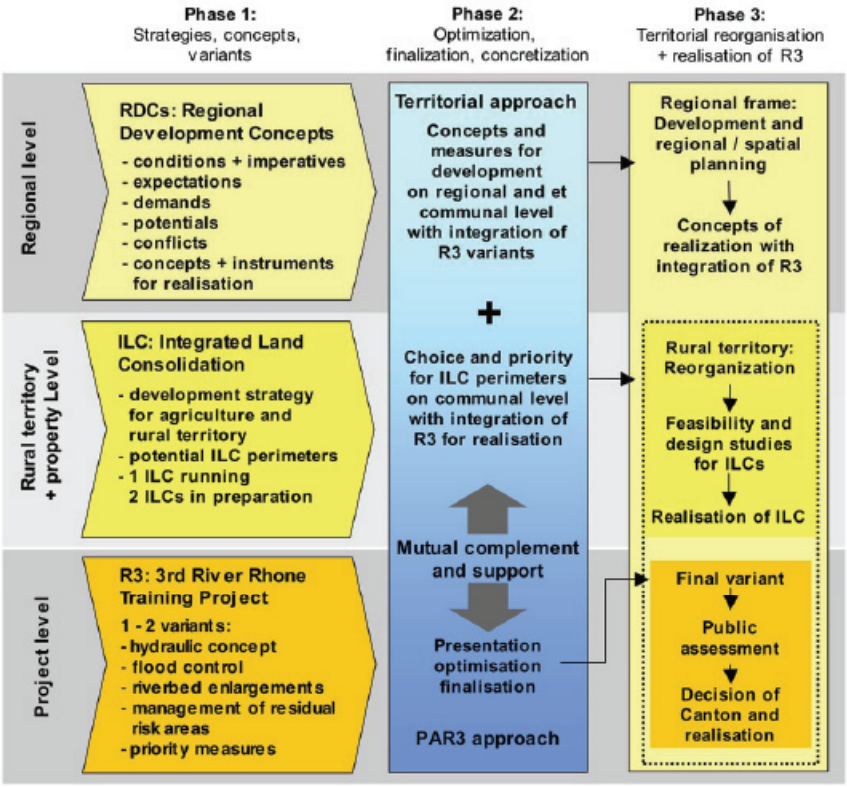

Fig. 5: The interrelations between R3, ILCs and RDCs .

In summary it can be concluded that the River Rhone Project has successfully initiated and facilitated an integrated and participatory land management approach, which has generated in a first phase a number of concrete results on three levels (figure 5, phase 1): On a regional level the six RDCs, on a rural territory and property level the three ILCs and the identification of 20 further territorial projects such as ILCs or projects for regional and communal development, and on a project level one or two R3 variants, matching the technical, hydraulic, environmental and socio-economic requirements. A successful integration of the R3 variants with a parallel investment into the development of the territory can only be achieved if the regions and communities complement the optimisation and finalisation of the R3 variants with a territorial approach (figure 5, phase 2).

For the following realisation (phase 3), the regions and communities have to prepare the overall regional development frame, whereas the communities will have to actively support the launching of ILCs in close collaboration with local stakeholders and actors in order to physically integrate the R3 into the river plain. This requires a close and ongoing

communication between the R3, the regions, communities, stakeholders and cantonal services during the optimization and finalization of the R3 variants (phase 2), which is now starting.

The R3 can have a catalytic effect, by providing, proposing and supporting the corresponding territorial procedures and implementing tools such as the RDCs and ILCs. However, the aim is, that the regions, communities and stakeholders can develop a high identification and a feeling of ownership for "their" River Rhone Project, which re-establishes the urgently needed flood protection.

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