

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to be Addressed

Marije LOUWSMA, Christiaan LEMMEN (Netherlands), Morten HARTVIGSEN (Hungary), Juhana HIIRONEN (Finland), Jean DU PLESSIS (Kenya), Mansha CHEN (USA), and Peter LAARAKKER (Netherlands)

Key words: Land Consolidation, Land Readjustment, Spatial Planning, Apeldoorn Declaration

SUMMARY

From 9 to 11 November 2016 the ‘symposium on land consolidation and land readjustment for sustainable development’ was held in Apeldoorn, the Netherlands. The symposium was a joint initiative from FIG commissions 7 and 8, the Food and Agriculture Organization of the United Nations (FAO), LANDNET, the Dutch Cadastre, Land Registry and Mapping Agency, and supported by Global Land Tool Network (GLTN) and the World Bank. About 200 participants from 50 countries shared their experiences and knowledge about state of the art practices of land consolidation and land readjustment across the world. The symposium resulted in the ‘Apeldoorn declaration on land consolidation and land readjustment for sustainable development’. Drawing on the Voluntary Guidelines on Tenure (VGGTs), the Sustainable Development Goals (SDG’s) and the New Urban Agenda of the United Nations, the declaration describes relevant issues in the field of land consolidation and land readjustment to be addressed. The many practical experiences with land consolidation and land readjustment should be used, acknowledging that no one-size-fits-all solutions exist. Instead of a one-size-fits-all solution we should look for a comprehensive approach in land consolidation and land readjustment that favors a sustainable development in the way that it benefits the people, planet and economic profit. Therefore it is important to have a solid land administration that can contribute to the development and implementation of land consolidation and land readjustment and vice versa. Land administration in this situation is used well beyond its traditional ‘registration mode’. The declaration addresses several topics and a diverse group of stakeholders to take up the implementation of the declaration. In general comprehensive, fit-for-purpose, participatory and inclusive approaches and solutions in land consolidation and land readjustment are promoted. In this paper we will elaborate on the declaration of Apeldoorn from different perspectives and different use contexts. Based on examples and practices across the world we will work towards a preliminary set of guidelines and recommendations for land consolidation and land readjustment practice.

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and Jean Du Plessis (Kenya)

FIG Working Week 2017

Surveying the world of tomorrow - From digitalisation to augmented reality
Helsinki, Finland, May 29–June 2, 2017

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to be Addressed

Marije LOUWSMA, Christiaan LEMMEN (Netherlands), Morten HARTVIGSEN (Hungary), Juhana HIIRONEN (Finland), Jean DU PLESSIS (Kenya), Mansha CHEN (USA), and Peter LAARAKKER (Netherlands)

1. INTRODUCTION

Land consolidation and land readjustment are two powerful instruments that facilitate the rearrangement of land rights in accordance with the desired land use development. Land is a limited but much demanded and highly valued resource. Different types of land use compete with each other, whether it be land for agriculture, natural resources, nature conservation or urbanization. Governments in many countries face the urgent need for a balanced and sound spatial development of its, possibly conflicting, land uses. The Sustainable Development Goals (SDG) stress the need for a sustainable development in the face of emerging demand for food, safety and a clean environment among others (United Nations, 2015).

The international symposium on land consolidation and land readjustment, held in Apeldoorn, the Netherlands from 9 to 11 November 2016, was concluded with the presentation of the [Apeldoorn Declaration](#). Presented experiences and knowledge from participants provided ample input for this declaration that brings forward ideas and recommendations about future applications of land consolidation and land readjustment. In this paper we will elaborate on the Apeldoorn declaration from different perspectives and different use contexts. In chapter 2 we will explain the underpinning principles that we mentioned in the declaration. Based on examples and practices across the world (chapter 3) we will work towards a preliminary set of guidelines and recommendations for land consolidation and land readjustment practice (chapter 4).

2. THE UNDERPINNING PRINCIPLES MENTIONED IN THE DECLARATION

2.1 No one-size-fits-all solution but fit-for-purpose

The exchange of land rights is the main underlying principle of land consolidation and land readjustment, whereby land consolidation generally focuses on rural areas and land readjustment on urban areas (including the incorporation of rural land into peri-urban and urban areas). The huge differences in the context within both instruments are applied, call for an approach tailored to the specific context at hand. Legislation, funding, culture, land use demands, and land administration systems for example vary from country to country. The variety in socio-economic circumstances and institutional arrangements among others justifies fit-for-purpose solutions towards the application of land consolidation and land readjustment. Nevertheless, we distinguish a number of common principles that characterizes appropriate applications of land consolidation and land readjustment.

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and Jean Du Plessis (Kenya)

FIG Working Week 2017

Surveying the world of tomorrow - From digitalisation to augmented reality
Helsinki, Finland, May 29–June 2, 2017

2.2 Comprehensive approach for sustainable development

Land is a valuable resource for several purposes, ranging from food production to providing a safe and healthy environment for the people. For the sustainable development of an area it is highly recommended to take into account the multiple purposes of land and its uses. Possibly conflicting land uses and solutions to prevent or mitigate potential negative impacts should be identified and discussed. A comprehensive approach in land consolidation and land readjustment allows for a balanced decision regarding the sustainable use of land with respect to and for the societal, economic and environmental needs.

2.3 Participatory approach

An important principle of both land consolidation and land readjustment is the reallocation of land rights. Therefore it is necessary that all right holders whom it concerns are involved in the process of land consolidation and land readjustment, whether these rights are documented or not. The extent to which they are involved may vary depending on the context, but we argue that participation should move beyond the information level towards a more powerful level of participation (see for example Arnstein, 1969, UN-Habitat, 2016). Apart from being informed, right holders and other stakeholders should be able to express their ideas and wishes regarding their new allocation and the plan in general, and ideally have a say in decision-making. In other words, they should be able to have a meaningful say in the process.

2.4 Inclusiveness

Inclusiveness refers to the process and outcomes of land consolidation and land readjustment projects, and means that no right holders or stakeholders should be excluded. Following the Voluntary Guidelines on the Responsible Governance of Tenure (VGGT), it is essential that all legitimate tenure rights are respected, whether they are formalized or not. In the case of land readjustment for example, this means taking steps to ensure that all stakeholders share in both the costs and benefits in a fair and equitable manner. This involves recognition of the land and property rights of all concerned, as well as due consideration their needs or interests. These can be related to project objectives, such as improving public space, enhancing connectivity or greater economic opportunities (UN-Habitat, 2012: 16).

2.5 Role of land administration

A solid land administration contributes to the development and implementation of land consolidation and land readjustment and vice versa. A strong integration between land consolidation and land administration can solve land registration problems as an integrated part of land consolidation practices. If tenure rights, in all its forms, is not clarified up front, it will often block the consolidation process. A successful implementation of land consolidation and land readjustment contributes to good land administration and land governance. Land administration in this situation is used well beyond its traditional ‘registration mode’.

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and Jean Du Plessis (Kenya)

FIG Working Week 2017

Surveying the world of tomorrow - From digitalisation to augmented reality
Helsinki, Finland, May 29–June 2, 2017

3. DIFFERENT USE CONTEXTS

3.1 A historical perspective: from single-purpose to multi-purpose land consolidation in the Netherlands

Current practice in land consolidation in the Netherlands reflects contemporary societal views on governance in relation to spatial planning, in particular the various forms of land consolidation. The form of today's practice did not emerge suddenly, but was shaped over the course of a hundred years influenced by socio-economic, environmental and technical developments. These changes led to adaptations in land consolidation's aims, legislation, funding, involvement of stakeholders and type of instruments. Taking a historical perspective, we will exemplify how land consolidation has evolved to meet the socio-economic demands.

Already in 1862 the idea for land consolidation arose to counteract land fragmentation (Staring, 1862). However, the first known attempts date back around 1900 and only in 1916 the first land consolidation deed for the Ballumer Mieden was registered (Berg, S. van den, 2004). The first land consolidation projects could learn from previous experiences in the division of communal land rights into individual land rights (see Demoed, 1987). The division of land was based on how individuals actually used the communal land or held use rights. This use was typically based on oral agreements or 'informal rules' that were established over time by habitual use of the land. Communal land rights were split up into individual land rights to transform extensively used heathland into arable land to increase food production needed due to population growth. The allocation of land rights is also part of land consolidation and therefore such experiences were valuable.

Land consolidation was a solution for land fragmentation and for modernizing agricultural practice by improving infrastructure and water management. Due to absent legislation they were employed on a voluntary basis, meaning that all participants had to agree with the new allocation. Because it was difficult to convince farmers to join a project, it was difficult to considerably improve circumstances for efficient and modern farming. Therefore, the government enacted the land consolidation Act in 1924 whereby land consolidation included all land owners in the area to improve agriculture. The Act judicially arranged that:

- land consolidation is not a form of expropriation but is an exchange of land rights
- minimal 25% of the land owners was required to apply for land consolidation
- a double majority (>50% of the land owners and >50% of the land) by voting was needed

Over time legislation was changed, but the main principle of reallocation remained. Between 1924 and 1945 several land consolidation projects were executed, yet the largest number of projects still had to come (Figure 1). After world war II, with a lack of food towards the end of the war, it was very important to have a stable food production to feed the people. The war destroyed farms and infrastructure considerably, which had to be repaired. Apart from that, mechanization in agriculture was needed to increase food production. Therefore, inadequate parcellation had to be improved as

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and Jean Du Plessis (Kenya)

FIG Working Week 2017

Surveying the world of tomorrow - From digitalisation to augmented reality
Helsinki, Finland, May 29–June 2, 2017

well. According to Mansholt, Minister of Agriculture at that time, land consolidation was indispensable to improve the parcellation and infrastructure to introduce mechanization in agriculture (Andela, 2000). As a consequence, the government funded land consolidation substantially and launched a long-term program to consolidate the land area by area. Although agriculture was still the main aim of land consolidation, it was also applied to improve life in rural areas by building new, modern farms according to standardized designs, and to use the rural areas for recreation.

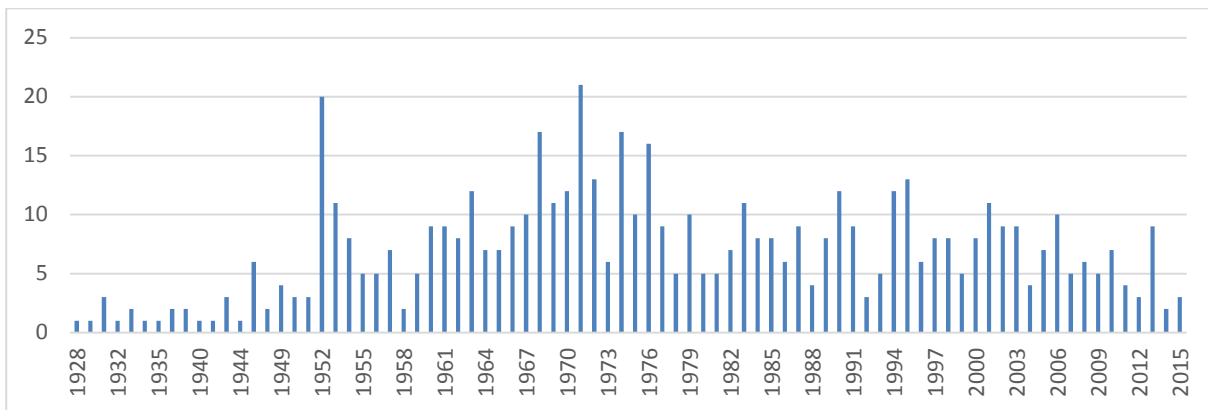


Figure 1 Number of land consolidation projects over time, based on deeds (Kadaster)

Last decades a comprehensive approach dominates practice, pursuing multiple aims in land consolidation projects such as climate change mitigation and adaptation measures (mostly related to water management), improve agriculture, landscape and nature conservation. This development can be interpreted as reaction to the previous period. In the 80's and 90's it became apparent that land consolidation led to uniform, rational landscapes which are good for agriculture, but affected nature and heritage landscape patterns negatively (Andela, 2000). In this period also awareness arose for environmental issues, e.g. pollution and pesticides, and the need for a sustainable development. These two developments reinforced the development of a comprehensive approach in land consolidation. Land consolidation significantly contributed to realize new nature areas as part of the national and European ecological nature network. The advantage of land consolidation over other instruments such as land purchase or expropriation, is that land owners can be compensated in land and that reallocation options usually outnumber the options based on land purchase in the regular land market.

Lately, the need for participation became more apparent. Not that land consolidation before was not participatory. At several moments land right holders were involved in land consolidation; voting, registration of lease contracts, expressing their wishes regarding the new allocation, the possibility to object to decisions are all forms of participation. However, another level of participation became in use in voluntary land consolidation that affected practice in formal land consolidation projects as well. In voluntary land consolidation no regulations with respect to the process exist, and therefore new forms of participation emerged (Louwsma et al, 2014). The level of participation shifted from information and consultation towards co-creation. Land owners sit together in groups to discuss

their wishes and possibilities for land exchange and ultimately design the reallocation plan with the help of the surveyor. Based on these experiences, also formal land consolidation projects that are subject to legal rules regarding procedures and processes (Rural Areas Development Act, 2007), sometimes incorporate this type of participation.

3.2 Comprehensive approach for sustainable development – experiences from Finland

Finland is the most forested country in the European Union: 86 % of the land area is classified as forestry land, of which 60 % are privately owned. Most privately owned forests are of small or medium size, with an average size of 30 ha (Finnish Statistical Yearbook of Forestry, 2013). Over the years, these privately owned family forests have been divided into smaller properties, mainly as a result of inheritance. In some parts of Finland, this has culminated in parcels that are long and narrow, which impede their use for timber production.

In forest land consolidation projects, long and narrow forest parcels are reshaped closer to square shapes, and the forest road and drainage networks are maintained or expanded. The reshaping of land parcels, among other effects, decreases boundary areas and therefore increases the forest area (Airaksinen et al., 2007; Kolis et al., 2014). Additionally, the improvement of drainage networks increases the growth of trees (Sarkkola et al., 2012). The increase of the total tree volume means that forest land consolidation leads to higher carbon storage in the forests.

The Pahkakoski forest land consolidation project, situated 600 km north of Helsinki, was carried out from 1990 to 1997. There are large mire areas and other wetlands in the project area, which lead to a considerably lower forested area (3500 ha) than the total project area (4892 ha). Due to the northern location and large peatlands, the growth of timber in the area is relatively low; the annual increment of growing stock in the area is 3.2 m³/ha (Honkanen, 2008). Before land consolidation, Pahkakoski was characterized by long, narrow properties; some up to 12 km long and less than 100 m wide (Figure 2). The smallest properties were less than 1000 m² and the road network was very limited.

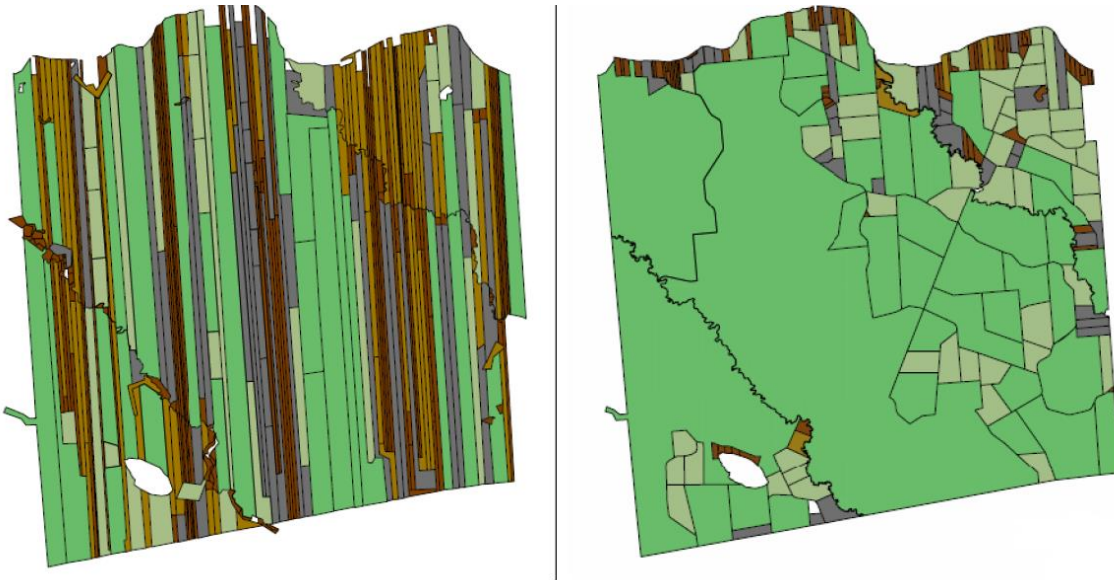


Figure 2 Pahkakoski forest land consolidation project before and after land consolidation (Map ©National Land Survey of Finland, permission 051/MML/15)

In Pahkakoski the number of parcels halved and the shape of the parcel became much more suitable for forestry. This improved considerably the profitability of forestry (see Kolis et al., 2014; Honkanen, 2008) but it also had other impacts. The productive forest area in Pahkakoski were calculated to have increased by 4% due to a reduction in boundaries and strip roads (Airaksinen et al., 2007). With an average annual growth of 3.2 m³/ha (see Honkanen, 2008), this corresponds to an increase in tree production of 448 m³/year.

Drainage works usually need to be carried out collectively for a large area, and land consolidation projects offer an opportunity for this. In Pahkakoski, 675 ha was drained, and the drainage was improved for 2372 ha (Airaksinen et al., 2007). The annual increase in tree growth between drained and undrained land varies between locations and studies. The implemented drainage measures improved the growth in at least an area of 822 ha (see Kolis et al., 2017), which corresponds to an increase in tree production of 658 m³/year.

Altogether, the increased growth of forests in the land consolidation area of 4892 ha was 1106 m³/year, which means an increase in tree production of 0.23 m³/ha/year.

The reduction of CO₂ is a physical phenomenon. This means that for every cubic meter that the tree grows, the same tree sequesters approximately 1.3 t of CO₂ in total biomass above and below ground. As the increased growth of forests in Pahkakoski was 1 106 m³/year, the reduction of CO₂ was, on average, 1434 tCO₂/year. The question remains, is 1434 tCO₂/year significant or not? When the reduction is converted to money and capitalized with 5 % interest rate, the benefit is approximately one million euros, which is about two thirds of the total project costs. That seems significant; keeping in mind that the reduction of harvesting costs covered already the project costs

(Kolís et al., 2017). To put it in even more understandable frames, we can observe that flying for example from Helsinki Finland to Beijing China produces 411 kg of CO₂/person. This means that one could fly from Helsinki to Beijing and back, every single day, for a five years, with the CO₂ savings done in Pahlkakoski in a single year.

3.3 Successful introduction of land consolidation in Lithuania

Land reform in Lithuania began in 1991 shortly after the independence. Agricultural land was restituted to the former owners or their heirs who lost their land rights during the collectivization process after WWII. Land reform in Lithuania resulted in a complete breakup of the large-scale collective and state farms during the Soviet era. The average agricultural holding size was in 2009 5.3 ha and the average size of agricultural parcels is 2.9 ha (Hartvigsen 2013). Thus, the average number of parcels per holding is around 1.8. In 2005, 53 percent of the total utilized agricultural area (UAA) was used through lease agreements. Farm structures are dominated by a mix of large corporate farms and medium-to-large family farms. Fragmentation of both landownership and land use exists at a medium level.

Lithuania received extensive international technical assistance for the development of the national land consolidation programme during 2000-2010. After less than six years of preparation, a National Land Consolidation Programme was operational already from 2005 (Hartvigsen 2015). The first small land consolidation pilot project was carried out during 2000-2002 with Danish technical assistance. The objective was to focus on improving the local agricultural structures through the reduction of fragmentation and enlargement of farms. The pilot area was 392 ha with 79 private landowners. Of these, 19 landowners participated in the project and 86 ha changed owner in the voluntary process. In a second Danish supported project, implemented during 2002-2004, the scope was wider. Three pilots were implemented in three different counties with the aim of integrating land consolidation with local needs for rural development. The legal framework for land consolidation was adopted in January 2004. The legal provisions draw on the experiences from the two pilot projects during 2000-2004.

In 2006, a Dutch supported and funded facilitated the preparation of a manual on environmental impact assessments (EIA) in relation to land consolidation and developed procedures for conducting cost-benefit analysis in land consolidation projects. FAO provided technical assistance during 2005-2007 to the preparation of a proposal for a National Land Consolidation Strategy and provided capacity development in land consolidation. The final version of the strategy was adopted by the Government in January 2008. The National Land Consolidation Strategy has embedded the land consolidation instrument in the overall land policy of the country and has since guided the development of the instrument.

The first 14 projects were started under the National Land Consolidation Programme in 2006 with funding secured from the Rural Development Programme (RDP) with EU co-financing. Unlike the other Central and Eastern countries with ongoing land consolidation programmes, Lithuania has chosen to apply land consolidation in a completely voluntary approach. According to article 2 of

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and
Jean Du Plessis (Kenya)

FIG Working Week 2017

Surveying the world of tomorrow - From digitalisation to augmented reality
Helsinki, Finland, May 29–June 2, 2017

the Law on Land, the objective of land consolidation in Lithuania is to: i) increase the size of land parcels; ii) form rational agricultural land holdings and improve their structure; and iii) create the required rural infrastructure. Thus, the main goal of land consolidation is to improve the structure of agricultural holdings as well as to be a tool for local rural development.

The Ministry of Agriculture has overall responsibility for the legal framework and funding under the RDP. The organization of land consolidation works changed substantially in 2010 when the county administration was abolished and the State Land Fund was established. The land fund is organized as a state enterprise and the land consolidation projects are managed by the land fund. The National Land Service under the Ministry of Agriculture approves the area to be included in the project and also gives the formal approval of the negotiated re-allotment plan. Projects are prepared by the local branch office of the State Land Fund, and with the fieldwork being carried out by private surveying companies.

The first 14 land consolidation projects were implemented during 2005. These projects had an average project area of 300 ha and an average of 45 participating landowners. The total project area in these projects was 4,838 ha and a total of 383 landowners participated. The total number of land parcels in the project areas was reduced from 731 to 512 as an outcome of the projects. In 2011, 23 new projects started and an additional 16 projects began in 2013, all funded under the RDP for 2007-2013. The available budget for land consolidation under the RDP was € 16.16 million. The total approved project area in the 39 mentioned projects was about 48,000 ha and the number of expected participating landowners around 5,800.

Lithuania developed a national land consolidation programme in less than six years, during 2000-2006, from the first small pilot project to the adoption of the legal framework and the start of the first regular projects. The first round of projects faced several problems and led to an amendment of the legal framework in 2010. The Lithuanian case shows that introduction of land consolidation in a country does not have to be a very lengthy process but also that it can be expected that it will be necessary to adjust legislation and procedures based on experiences from the first round of projects even if pilots have been implemented earlier.

3.4 PILaR: the case for participatory and inclusive land readjustment

In contexts of rapid urbanisation, national and local governments are called upon to provide shelter, housing, services, public infrastructure and safe public spaces. To achieve this requires land. In the absence of available public land, effective mechanisms are needed to acquire it. The two main ways are to buy land on the open market or through compulsory acquisition. However both are cumbersome and expensive processes – making it almost impossible for many governments to plan and develop, or redevelop, large areas in a systematic way. Compulsory acquisition is often incapable of meeting the needs for public space, infrastructure and re-organisation of the urban fabric, in that it is a time consuming and expensive process for all concerned; as well as highly controversial and destructive when it involves involuntary dispossession and/or forced eviction. In

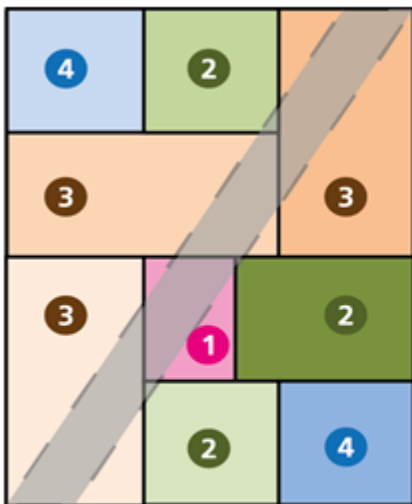
Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and Jean Du Plessis (Kenya)

FIG Working Week 2017

Surveying the world of tomorrow - From digitalisation to augmented reality
Helsinki, Finland, May 29–June 2, 2017

addition, as Figure 3 shows, compulsory acquisition fails to capture returns from increases in land values for public benefit and the outcomes are often inconsistent with the needs of urban planning.

Land readjustment, on the other hand, has shown more promising results, in that it can provide access to land for public use by capturing a proportion of the value created by development (Figure 4). It gives the authorities greater capacity for intervention to promote fairer outcomes at lower cost within a more functional urban planning framework. In basic terms, readjustment is the pooling of all the land parcels in a particular area and planning them as a unit – putting in roads, sewerage and other infrastructure –, and then dividing up the land again to the original land owner or user. Each landowner and land user gets a plot back which is usually smaller than the area he or she originally contributed to the common pool. But the plot is now more valuable: it has infrastructure and services, it has formal documentation, the area has been re-zoned, and different types of use are permitted.



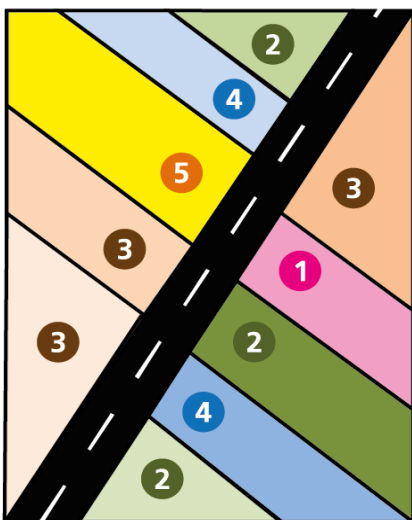
Landholders 1 will lose out: their land will be purchased at a price determined by the city (or a court), with not enough left for a viable plot. They will be displaced.

Landholders 2 will lose a small part of their land and be left with some frontage on the road – enough for access, raising considerably the value of their remaining plots

Landholders 3 lose a larger chunk of land to compulsory acquisition but are left with larger road frontages.

Landholders 4 do not benefit at all: left without road access

Figure 3 Compulsory acquisition: outcomes for different landholders (UN-Habitat, 2016:11)



Outcomes through land readjustment

After a land readjustment process, with new land allocations, each landholder gets a smaller, but more valuable plot with road frontage.

No one is displaced, and the costs and benefits are shared.

Rather than a few landholders giving up all their land, all give up a little, creating the public space required for the road.

In addition to the road itself, the municipality is allocated plot 5, which it can use for public space or sell to cover the cost of providing the infrastructure.

Figure 4 Land readjustment: outcomes for landholders (UN-Habitat, 2016:11)

There have been some notable successful applications of land readjustment. Success depends on numerous factors including strong and well-resourced local authorities, a supportive regulatory framework, access to quick and effective dispute-resolution mechanisms accessible to all, a well-functioning land records system, and so on. In addition, the ability to adapt the methodology to the particular conditions, stakeholders and circumstances of the locality where it is being applied, is also very important.

UN-Habitat and the Global Land Tool Network (GLTN), supported by land experts and organisations, have spent more than five years developing a land readjustment approach that would be more suitable to meet some of the particular challenges faced in developing country contexts.

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
 Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and Jean Du Plessis (Kenya)

FIG Working Week 2017

Surveying the world of tomorrow - From digitalisation to augmented reality

Helsinki, Finland, May 29–June 2, 2017

The design process included initial research, detailed case studies, expert consultations, process design and review, a writeshop and an implementation pilot. The result was an adaptation of land readjustment called “Participatory land Inclusive Land Readjustment, or PILaR” (UN-Habitat, 2016). PILaR has been pilot tested at La Candelaria in Medellin, Colombia (Buhigas et al., 2016).

Summarized, the main defining features of PILaR are:

- It emphasizes a participatory process, rather than only the technical or financial results
- It engages with all community members, not just the formal landowners, maximizing the likelihood of consensus, reducing the risk of disruption, and protecting weaker groups
- It aims for inclusive outcomes that benefit all, including the poor and vulnerable
- It is based on human rights and aims for a pro-poor, gender-sensitive outcome.
- It aims to distribute the burdens and benefits more equally among the private and public sectors (through public-private partnerships, legal reforms and capacity building)
- It strengthens governance through a preliminary urban legal assessment and by building the capacity of government authorities
- It improves land administration – the systems of land records and valuation – making it possible to share the value of the land more equitably. By identifying the claimants to the land, it can be a first step to regularizing their tenure.
- It integrates land readjustment with other urban development and planning initiatives
- It can be varied to suit a particular context and situation.
- It is used in conjunction with a number of pro-poor, gender responsive land tools.

3.5 Applications of Land Readjustment in Developing Countries

Land readjustment has been used in many countries as a tool to promote more inclusive and efficient urban development. It refers to a participatory process that also fosters trust and collective actions, because landowners are empowered to make decisions on planning, servicing and redevelopment.

In principle, land readjustment can achieve five policy goals, if it is implemented carefully.

- First, it can assemble land for urban expansion and revitalization with minimal displacement.
- Second, land readjustment can help recover a portion of the project cost.
- Third, it can promote maximization and intensification of land use, thereby enhancing land value for landowners and expanding the property tax base for the municipality.
- Fourth, land readjustment can distribute land redevelopment costs and benefits equitably among landowners and other stakeholders such as the municipality, private developers, and the community, especially the urban poor and landless.
- Fifth, land readjustment can encourage public participation in policy decision-making.

Land readjustment or similar methods have been used or experimented with in many countries to facilitate peri-urbanization, urban regeneration including slum upgrading, and post-disaster and post-conflict reconstruction. The earliest application of land readjustment or land consolidation is to assemble fragmented farmland for either higher productive agricultural uses or for urban expansion. Instead of acquiring land from farmers to facilitate rural productivity enhancement or urban activities, farmers are asked to partake in these investments and to share the development benefits

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and Jean Du Plessis (Kenya)

FIG Working Week 2017

Surveying the world of tomorrow - From digitalisation to augmented reality

Helsinki, Finland, May 29–June 2, 2017

generated by structural economic changes. In many cases, this arrangement has protected farmers' economic wellbeing and at the same time lowered the monetary and negotiation costs of land assembly for urban development (Box 1). Land readjustment is also employed to facilitate infill redevelopment. However, the frequency is much lower than that of using it for peri-urbanization. This is because development densities in urban centres are already quite high in most cases and thus the number of landowners affected by redevelopment is normally large, rendering the application of land readjustment more difficult. That said, many developing countries have adopted land readjustment or land sharing to deal with informal settlements in their cities (Box 2). This is largely due to the concern about the potential political controversies and adverse effects on the livelihoods of self-settlers caused by forced eviction.

In addition, land readjustment has played an instrumental role in rebuilding some war-torn and natural-disaster-affected regions. For example, in Japan, LR was used to rebuild Tokyo after the Great Kanto Earthquake in 1923, and the Kobe Earthquake in 1995, as well as the post-war reconstruction after World War II. In India, the Town Planning Scheme approach was used to reconstruct the historic city of Bhuj after a severe earthquake in 2001. The Development Workshop, a non-profit organization, has used land readjustment to upgrade an informal settlement in Huambo in Angola.

In addition to supporting implementation of land readjustment projects in Bhutan, India and Indonesia, since March 2015, the World Bank has been providing technical support to Tra Vinh City in Vietnam on a pilot land readjustment project, as well as to national ministries on legislation that would enable wider application in Vietnam. In 2015, the World Bank also launched an e-learning course on Land Readjustment through its Open Learning Campus¹ to discuss practical lessons from applications of LR in the developing world and emerging economies.

¹ The Land Readjustment e-learning course can be accessed via the World Bank Open Learning Campus at: <https://olc.worldbank.org/content/land-readjustment-self-paced>

4. GUIDELINES AND RECOMMENDATIONS

Box 1: Land Pooling in Bhutan (Norbu, 2014)

Thimphu, the capital city of Bhutan, is challenged by significant urban population increase, on top of an already haphazard development pattern and inadequate infrastructure. Since 2003, the city planning authorities adopted the land pooling approach to cope with these problems, even though Bhutan did not have any legislation that would guide or legitimize the land pooling practices. Land pooling was intended to reconfigure existing land in such a way that each landowner retained a smaller parcel close to their original location but with improved access to local infrastructure, amenities, and services. It was also intended to avoid the complicated and contentious land acquisition process of eminent domain.

Land pooling involved bringing many different—and even conflicting—interests together to agree upon a redevelopment plan for the City. With extensive public participation and consultation, city officials were able to achieve a unanimous consensus among landowners to contribute a portion of their land for infrastructure development. Based on substantial land pooling experience, Bhutan formalized land pooling with the adoption of the Land Pooling Rules and Regulations in 2009, which provides a legal basis for land pooling and offers dispute-resolution mechanisms for occupants or landowners unwilling to be part of the process. By then, 12 land pooling schemes were already approved for implementation, including 7 financed through World Bank and Asian Development Bank loans.

Box 2: Land Sharing in Thailand (Leeruttanawisut, 2014)

The most often used land-readjustment-like method that is tailored for informal settlement upgrading is land sharing. Land sharing originated in Bangkok, Thailand during the 1970s and 1980s as an innovative way to resolve land conflicts between legal landowners and informal settlers. The approach involves the partitioning of a parcel of contested land so that the landowner regains access to a large portion of the original parcel, free of squatters, for redevelopment. At the same time, the informal settlers can stay on or near their present site on another portion of the land, with improved housing and local services and legal tenure.

The Sengki project is considered to be one of the most important and successful cases of land sharing in Bangkok. Sengki is an urban poor community that was upgraded in a participatory manner in partnership with the National Housing Authority of Thailand in the early 1990s. Up until the early 1930s, the land in Sengki that the poor occupied belonged to close relatives of His Majesty, the King of Thailand. The residents rented the land from the Royal Property Bureau (now the Crown's Property Bureau) at below-market rates. In early 1984, the agency that managed the royal property offered to sell a portion of the land to existing residents, and an agreement was reached in 1987. A cooperative was formed to negotiate with the managing agency and the National Housing Authority and was in charge of collecting payments from participating residents and overseeing the implementation of the project.

The examples describe different use contexts for land consolidation and land readjustment. In countries with a long tradition, the instruments have evolved responding to changing socio-

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and Jean Du Plessis (Kenya)

FIG Working Week 2017

Surveying the world of tomorrow - From digitalisation to augmented reality

Helsinki, Finland, May 29–June 2, 2017

economic and environmental demands and by new technical developments. Today's practice exemplifies that land consolidation can be applied for nature conservation and climate change adaptation purposes in addition to its traditional application for agriculture. Land consolidation instruments should by definition be multi-functional in the understanding that several objectives are pursued in the same project, e.g. agricultural development in one part of the project area and nature restoration or large infrastructure construction in another part. Some functions even can be spatially interwoven instead of being spatially segregated, because these functions mutually benefit from each other. Creating areas for temporary water catchment in times of superfluous rainfall may blend well with nature conservation or extensive farming for example. Achieving the multi-faceted and complex Sustainable Development Goals will also influence how land consolidation projects are implemented, because it will require a more holistic and integrated approach. Likewise, land readjustment practice shows that it is possible to improve urban development – with multiple functions – in a planned way with respect for the needs of society at large and the rights of individuals.

Many countries have a formal framework (legislation, policies, governance system) in place to rely on when implementing land consolidation and land readjustment projects. The addressed practices emphasize the role of this formal framework for land consolidation and land readjustment practice and its relation with socio-economic and environmental developments in society at large. An appropriate and widely accepted framework is valuable as it prevents that issues related to the exchange of land rights have to be sorted out during the implementation of the project. Such a situation will, apart from creating insecurity among stakeholders, lead to delay in the implementation of projects.

In places where no formal framework exists, we recommend that at the very least a fit for purpose framework is put in place in order to increase the chances of success in land consolidation and land readjustment projects. This fit for purpose framework should clarify the procedures, processes, roles and responsibilities that are to be followed, and these should be clear from the beginning of a project to allow for a transparent process.

The mentioned principles of participation, inclusiveness and sustainability should be incorporated in these frameworks.

The addressed practices also show that it's not just one party responsible for the developments in and implementation of land consolidation and land readjustment, but that many different stakeholders have, directly or indirectly, a role in the process. Apart from the government, land owners and land users, cadastres, spatial planners, professionals, academia, and international development agencies and non-government organizations can all contribute to the implementation of mentioned principles (comprehensive, fit-for-purpose, participatory and inclusive approach) in land consolidation and land readjustment practice.

We call upon *governments* to align land administration, consolidation and management. Governments at all levels should further develop the approach in the context of the global agenda and to share knowledge and experience with other countries on strategic and operational level.

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and Jean Du Plessis (Kenya)

FIG Working Week 2017

Surveying the world of tomorrow - From digitalisation to augmented reality
Helsinki, Finland, May 29–June 2, 2017

We call upon *land owners* and *land users* to have a say in these processes. Land owners and users should ask for and can initiate participatory forms of land consolidation and land readjustment. The people to whom it concerns, need the possibility to have a say in these processes to capture all viewpoints, expertise and needs regarding a sustainable development of the area.

We call upon *academia* to develop their curricula including land consolidation. Academia should support the inclusion of land consolidation and land readjustment approaches into their curricula for spatial planning, land management, land administration, agricultural and survey engineering programmes; to support research on the use of the approach to defend humanity to climate change and in provision of food security at local levels; to support research in land information management in support to land consolidation and land readjustment for sustainable development.

We call upon *cadastres* to use the data and let their systems evolve. Land administration, land registries and cadastre agencies should develop interfaces between the available land data with land consolidation and land readjustment projects at all required levels. Today's land administration systems are mainly used in 'registration' mode. With all the information available within these systems, and in related data sets within the spatial data infrastructure, it may be well situated to be used in 'design' mode.

We call upon *spatial planners* to use land consolidation and readjustment as implementation tool. The benefits of these tools for the implementation of spatial plans to optimise land use should be recognised.

We call upon *professionals* to develop and disseminate knowledge. Professionals should further develop and promote a comprehensive approach in support to urban and rural development. They may establish a reliable and stable governance framework to allow that involved stakeholders can participate and can benefit from land consolidation and land readjustment.

We call upon *international development agencies* and *non-government organisation* to act as intermediary between the government and land owners and land user and facilitate cooperation among stakeholders. They could provide financial and technical support to the piloting and scaling up of land consolidation and land readjustment projects, and use their convening power to organise knowledge exchange activities and disseminate lessons learned.

We all should use these practices and the lessons learned, to further develop the approach in the context of the global agenda and to share knowledge and experience with other countries on strategic and operational level. Land consolidation and land readjustment are often needed to appropriately respond to contemporary challenges such as climate change, sustainable food production and a growing population while the classical objectives such as agricultural and rural development remain valid in many countries. Land consolidation and land readjustment need a worldwide scope in order to answer the question on how to use our land in the most sustainable way, not only from a local or regional point of view, but also from a global one.

The full text of the Apeldoorn Declaration is available [here](#).

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and Jean Du Plessis (Kenya)

FIG Working Week 2017

Surveying the world of tomorrow - From digitalisation to augmented reality
Helsinki, Finland, May 29–June 2, 2017

REFERENCES

- Airaksinen, M., Lääti, M., Mikkola, A., 2007. Metsien kiinteistörakenteen pirstoutuneisuus (in Finnish), vol. 104. Publications of National Land Survey of Finland, 52 p.
- Andela, G., 2000. Kneedbaar Landschap, kneedbaar volk. Over de planmatige aanpak van de modernisering van het naoorlogse landschap. Toth, Netherlands.
- Arnstein, S., 1969. A ladder of citizen participation. *Journal of the American Institute of Planners*, 35, pp 216-224.
- Bergh, S. van den, 2004. Verdeeld land – de geschiedenis van de ruilverkaveling.
- Buhigas, M. Lewis-Lettington, R. Ochong, R. Participatory and Inclusive Land Readjustment: a Pro-Poor Land Management Strategy for City Redevelopment (The Case of Medellin, Colombia). Proceedings of the 2015 World Bank Conference on Land and Poverty, 23-27 March 2016.
- Demoed, H.B., 1987. Mandegoed schandegoed : een historisch-geografische beschouwing van de markeverdelingen in Oost-Nederland in de 19e eeuw. Zutphen, Netherlands.
- Finnish Statistical Yearbook of Forestry, 2013. Finnish Forest Research Institute. 448 p.
- Hartvigsen, M. (2013): Land Reform and Land Fragmentation in Central and Eastern Europe. *Land Use Policy* 36 (2014), 330-341.
- Hartvigsen, M (2015): Experiences with Land Consolidation and Land Banking in Central and Eastern Europe after 1989. FAO Land Tenure Working Paper 26.
- Honkanen, M., 2008. Metsätillusjärjestelyn vaikuttavuus ja kannattavuus (in Finnish). Mikkeli University of Applied Sciences, Bachelor's thesis. 89 p.
- Kolis, K., Hiironen, J., Ärölä, E., Vitikainen, A., 2014. Effects of sale-specific factors on stumpage prices in Finland. *Silva Fennica* 48 (3), 18, <http://dx.doi.org/10.14214/sf.1054>.
- Kolis, K., Hiironen, J., Riekkinen, K., Vitikainen, A., 2017. Forest land consolidation and its effect on climate. *Land Use Policy* 61 (2017): 536–542.
- Leeruttanawisut, K., 2014. Revisiting Land Sharing in Bangkok: The Sengki Case. Working paper series, no. 5-2014. Cambridge, MA: Land Governance Laboratory.
- Louwsma, M. Beek, M. van, Hoeve, B., 2014. A new approach: participatory land consolidation. XXV FIG congress “Engaging the Challenges, Enhancing the Relevance”, 16-21 June 2014, Kuala Lumpur, Malaysia.
- Norbu, G., 2014. Land Pooling In Thimphu, Bhutan. Working paper series, no. 7-2014. Cambridge, MA: Land Governance Laboratory.
- Rural Areas Development Act, 2007. Accessed on 3-1-2017
http://wetten.overheid.nl/BWBR0020748/geldigheidsdatum_03-01-2017
- Sarkkola, S., Hökkä, H., Ahti, E., Koivusalo, H., Nieminen, M., 2012. Depth of water table prior to ditch network maintenance is a key factor for tree growth response. *Scand. J. For. Res.* 27, 649–658, <http://dx.doi.org/10.1080/02827581.2012.689004>
- Staring, W.H.C., 1862. Huisboek voor den Landman in Nederland. Netherlands.
- United Nations, 2015. Transforming our world: the 2030 Agenda for Sustainable Development. A/RES/70/1 available from undocs.org/A/RES/70/1
- United Nations Human Settlements Programme (UN-Habitat), 2016. Remaking the urban mosaic: Participatory and inclusive land readjustment. Nairobi, Kenya.

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and Jean Du Plessis (Kenya)

FIG Working Week 2017

Surveying the world of tomorrow - From digitalisation to augmented reality
Helsinki, Finland, May 29–June 2, 2017

BIOGRAPHICAL NOTES

All authors have contributed to the ‘Apeldoorn Declaration’ from their field of expertise and professional experience.

CONTACTS

Marije Louwsma, MSc
Cadastre, Land Registry and Mapping Agency
PO Box 9046
7300 GH Apeldoorn
THE NETHERLANDS
Tel. +31 88 183 44 63
Email: marije.louwsma@kadaster.nl
Web site: www.kadaster.nl

Dr Ir Christiaan Lemmen
Cadastre, Land Registry and Mapping Agency
PO Box 9046
7300 GH Apeldoorn
THE NETHERLANDS
Tel. +31 88 183 31 13
Email: chrit.lemmen@kadaster.nl
Web site: www.kadaster.nl

Morten Hartvigsen
FAO Regional Office for Europe and Central Asia
34 Benczur utca
H-1068 Budapest
HUNGARY
Tel. +36 (1) 814 1250
Email: Morten.Hartvigsen@fao.org
Web site: www.fao.org

Dr Juhana Hiironen
Aalto University, School of Engineering
Department of Built Environment
P.O. Box 12200
FI-00076 Aalto
FINLAND
Email: juhana.hiironen@aalto.fi
Web site: <http://maa.tkk.fi/en/>

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and
Jean Du Plessis (Kenya)

FIG Working Week 2017
Surveying the world of tomorrow - From digitalisation to augmented reality
Helsinki, Finland, May 29–June 2, 2017

Mr Jean du Plessis
Land and GLTN Unit, UN-Habitat
PO Box 30030
GPO Nairobi 00100
KENYA
Tel. +254 20 7625217
Email: jean.duplessis@unhabitat.org
Web site: www.gltm.net, www.unhabitat.org

Mansha Chen
World Bank
1818 H Street NW, MC4-414
Washington, DC 20433
USA
Tel. +1 202 473 9546
Email: mchen2@worldbank.org
Web site: www.worldbank.org

Peter Laarakker MSc LLM
LAR&S Consultancy
Ruitenborghweg 3
7722PA Dalfsen
THE NETHERLANDS
+31 657643269
Email: pmlaarakker@gmail.com

Land Consolidation and Land Readjustment for Sustainable Development – the Issues to Be Addressed (8973)
Marije Louwsma, Christiaan Lemmen (Netherlands), Morten Hartvigsen (Hungary), Juhana Hiironen (Finland) and
Jean Du Plessis (Kenya)

FIG Working Week 2017
Surveying the world of tomorrow - From digitalisation to augmented reality
Helsinki, Finland, May 29–June 2, 2017