

## **SOCIAL AND ECONOMIC MONITORING AND EVALUATION OF LAND CONSOLIDATION PROJECTS AFTER APPLICATION**

**Atakan SERT, Reha Metin ALKAN, Ali Riza CEYLAN, Önder KARAGÖZ, Cüneyt VANLI, Turkey**

**Key words:** land consolidation, land fragmentation, irrigation, monitoring, evaluation,

### **SUMMARY**

Turkey's land consolidation activities are carried out by different agencies since 1961. Irrigation rates gets higher when the land consolidation processes are applied together with the irrigation and drainage projects. Land consolidation is creation of new parcels that are geometrically smooth, with a narrow sense of land financing and the incorporation of small sized and scattered parcels of common stakeholders. With land consolidation, benefits such as fuel saving, reduction of field borders, reduction in costs of spraying, fertilizing, planting and labor, as well as product marketing, and saving time as harvest facilitation are all well known. However, due to the business intensity of the Institutions, they tend to new projects. After the land consolidation project is completed, the social and economic developments and changes over the years cannot be explored much.

In this paper, it will be evaluated whether the polls those has taken over farmers in terms of social and economic issues such as post-consolidation, ownership, land use are met, or not.

As a result, Land consolidation is not just the creation of new parcel plan. It is one of the major components for rural development and, In the light of the monitoring and evaluation reports, which are highlighted by this paper, will convey the future strategy of DSİ to the land consolidation projects with the questionnaires to be done by the villagers.

### **SUMMARY**

Türkiye' de arazi toplulaştırması 1961 yılından itibaren farklı kurumlar tarafından yapılmaktadır. Arazi toplulaştırması sulama ve drenaj projesi ile birlikte uyguladığında, sulama oranı artmaktadır. Arazi toplulaştırması dar anlamda arazi maliği ve ortak hissedarlarının küçük dağınık parsellerin bir araya getirilmesi ile, geometrik olarak düzgün yeni parseller oluşturulmasıdır. Arazi toplulaştırması ile mazot tasarrufu, tarla sınırlarının azalması, ilaçlama, gübreleme, ekim ve işçilik masraflarının azalmasının yanında ürün pazarlama, ve hasat kolaylığı zamandan tasarruf gibi gelir artırıcı gibi faydaları herkes tarafından bilinmektedir. Ancak Kurumların iş yoğunluğu nedeniyle yeni projelere yönelirler. Arazi toplulaştırma projesi tamamlandıktan sonra yıllar içindeki sosyal, ekonomik gelişmeleri ve değişimleri çokça araştırılmamaktadır.

Bu bildiri de toplulařtırma sonrası, mülkiyet, arazi kullanımı gibi sosyal ve ekonomik konular açısından çiftçilere yapılacak anketler sonucu beklentilerin karşılanması deęerlendirilecektir.

Sonuç olarak; arazi toplulařtırması sadece parselasyon planının hazırlanması deęildir. Kırsal kalkınmaya yönelik dięer tüm bileşenlerden birisidir. Bu bildiri sonucu hazırlanan izleme ve deęerlendirme raporu doęrultusunda DSİ tarafından köylerde yapılacak anketlerle ileriki yıllardaki arazi toplulařtırma projelerine yön verecektir.

# **SOCIAL AND ECONOMIC MONITORING AND EVALUATION OF LAND CONSOLIDATION PROJECTS AFTER APPLICATION**

**Atakan SERT, Reha Metin ALKAN, Ali Riza CEYLAN, Önder KARAGÖZ, Cüneyt VANLI, Turkey**

## **INTRODUCTION**

Land consolidation projects are mainly held by two different public institutions in Turkey, These are “General Directorate of State Hydraulic Works (DSİ)” and “General Directorate of Agricultural Reform (TRGM)”. The application of land consolidation projects increases irrigation efficiency and irrigation rates in irrigation projects and also reduces the investment costs of irrigation projects at a rate that can be considered as very important. Despite the rapid growth of the world population, our indispensable natural resources such as soil and water are diminishing. It is a bitter truth that industrialization and unplanned urbanization have caused our agricultural lands under the pressure of zoning and water resources have become polluted. The geography where our country is not located on rich water belt, but unfortunately our water resources is sufficient. Over the last fifteen years, the importance of closed irrigation systems and land consolidation has increased even more for the deliberate use of water resources.

## **1. LAND CONSOLIDATION PROJECT IN TURKEY**

### **1.1 Land Registry and Cadastral Activities**

The first Title Deed was established on May 21, 1847 in our country. In 1925 the cadastral unit was added. It was established in 1953 as "Directorate of Land Cadastre and Photogrammetry Department". The cadastre is generally referred to as the process of linking the rights and obligations of the grounds, locations, areas, values, and so on of any kind of land in a country to the state plan or in other words the map. Turkey's agricultural lands are mostly 1/5000 scale photogrammetric maps of the valorisation of the results of the cadastral it was made. Turkey's entire cadastre is completed. However, attempts to analyze the errors, deficiencies and deficiencies in cadastral works have been tried and cadastre renewal, 2 cadastre have been started since 2005 to give priority to the faulty regions. The map in the private sector is also made by the firm. All of the urban land and the majority of the rural land are prepared in computer CAD environment. and parcels can be queried on the internet. Agricultural activity cadastral parcels 28,5 million pieces.

### **1.2 History of Land Consolidation and Current Situation**

The first land consolidation project in our country was carried out by Konya Çumra in 1961 by the General Directorate of Soil and Water. In between 1984 and 2005, General Directorate of Rural Services of KHGM conducted a land consolidation of 350 thousand hectares of land in 35 province and 21 years. In Village Services, DSİ is the priority for irrigation. Between 2007 and 2016, TRGM continues to work on 3.5 million hectares of land consolidation projects in

all agricultural land. In the last twenty-five years, in parallel with the rapid development of computer technologies and after the private sector opened in 1987, land consolidation projects have accelerated. As DSİ General Directorate of State Hydraulic Works, we are constructing dams and irrigation projects in order to use our country's water resources consciously. Based on the Soil Conservation and Land Use Law, we have been carrying out a project of land consolidation of 480000 hectares from 2009. Our vision as DSİ is to be the leader organization in the protection, development and management of water resources.

### **1.3 Land Consolidation- Implementation Steps**

The procedural and implementation steps that need to be completed consist of;

- Creation of base maps and ownership records,
- Establishment of soil maps and soil classification maps,
- Acquisition of other supplementary base maps if needed (such as orthophotos)
- Creation of blocks on the terrain x Interviews with farmers to find out about their preferences
- Creation of new parcel plans x Implementation of the necessary works in the field ( roads, irrigation and drainage canals etc.)
- Delivery of new title deeds to the beneficiaries

#### **1.3.1 Acquisition of Base Maps and Ownership Records**

Cadastral maps and ownership information are obtained for the targeted locations from the General Directorate of Cadastre and Land Registry (TKGM) and are digitized if needed. Any mismatches and errors are identified during this step, hence corrective legal action is taken. Web services of TKGM are also in use for 3 years, thus eased to get registral and vector based cadastral maps. But digital data gathered from web services may need correction, i lack of correctness

#### **1.3.2 Establishment of Sol Maps and Soil Classification Maps**

Soil specimens are taken by the agricultural engineers who specialize in soil, and soil maps are prepared after analysis in the laboratory. The soil maps are composed of index values and soil scores, and the result is a score assigned to each parcel. A fifteen-day public display follows at the site. If there are farmers who object within this period, their objections are recorded and addressed, and the results are communicated to them in writing.

#### **1.3.3 Acquisition of Additional Mapping Material**

It is possible for the cadastral maps to exclude some key features on the terrain. These may be user roads, and fixed facilities, such as orchards, wells, buildings etc. in the consolidation area. These features are duly marked on the orthophoto or other maps.

#### 1.3.4 Creation of Farming Block

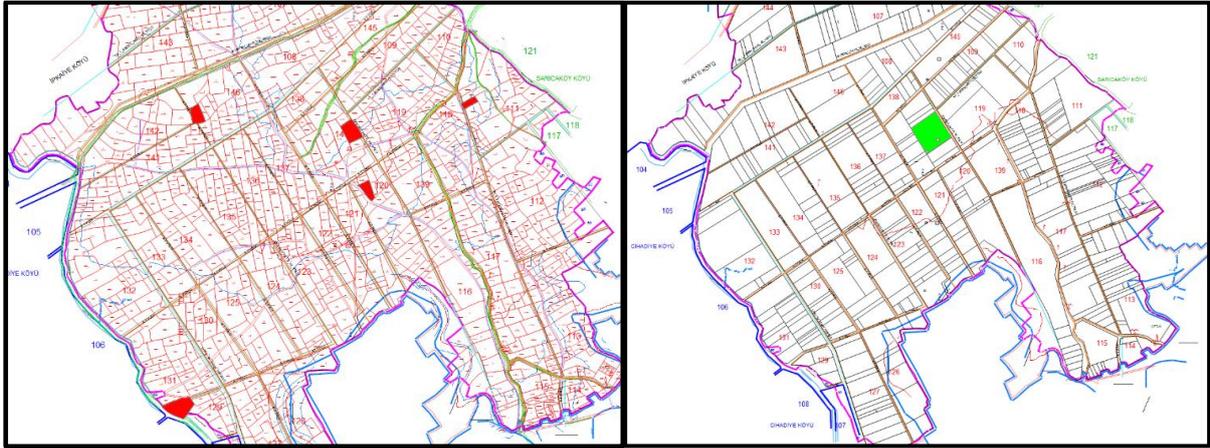
Blocks are formed between the irrigation canals (constructed or to be constructed by DSI) and other landmarks such as roads, creeks etc. on the ground.

#### 1.3.5 Interviews with Farmers

Farmer preferences are recorded during interviews with respect to the proposed blocks and soil classification maps. The farmers declare in writing where they would like to see their new consolidated parcel (or more than one parcel where appropriate). Farmers' preferences thus obtained are taken into consideration during the creation of the new parcels. During these interviews farmers can opt for a consolidation of scattered family property (under different ownership) including spouse and children. In addition, farmers may opt for consolidation of commonly owned but geographically scattered property rights (with established rights but without specific cadastral location of the commonly held land) and may request such rights to be consolidated in a single parcel owned by a single family. Those persons who own land in the neighboring villages may request to have their new consolidated parcel located near the boundary to the neighboring village where they may be domiciled. Every village in the project area is a consolidation unit within its proper boundaries. However, boundary adjustment can also be made between the neighboring villages if and when required

#### 1.3.6 Creation of New Parcel Plans

After the issue of farmers' preferences has been addressed, a new parceling plan is prepared according to the topography of the land, farm sizes, farmer preferences, fixed installations (wells, orchards), and current land use and soil classification maps. The new parceling plan is put on public display on site for 15 days. Written farmer objections and grievances are recorded and a new parceling plan is prepared if deemed necessary. The renewed parceling plan is also put on public display for another 15 days. If there are still objections, these are recorded and taken into account to prepare the final parceling plan. After approval by the GDAR, this final plan is sent to the General Directorate of Cadastre and Land Registry (or its regional office) for control and to be entered into the land registry for the new titles to be issued. The new parcels resulting from the LC are marked in the field.



Shape .1 Balıkesir Biga Dereköy (red before LCP/ yellow After LCP) by DSİ

### 1.3.7 Delivery of Titles to Farmers

After the control by the Cadastre and Land Registry, the new parceling plan is processed and the new titles are issued and distributed to the farmers

### 1.3.8 Field Works to be Undertaken

LC process is completed by building the necessary infrastructure, which consist of the road network, irrigation and drainage systems and on-farm works (land improvement and soil reclamation, land leveling, on-farm drainage etc.).

## 1.4 Primary Causes of Land Fragmentation

GDAR General Directorate of Agricultural Rural, identifies five major causes underlying land fragmentation in Turkey. Land fragmentation emanating from the civil code (inheritance, Land fragmentation caused by building irrigation and drainage channels, Land fragmentation LF caused by general infrastructure development (transport, network, roads, railways, etc.), Voluntary property subdivisions by partial sales, Expropriations made by various institutions. It is useful to elaborate further on the causes of LF and try to understand the negative consequences associated with it. As noted above, population pressure, inheritance and higher intensity of land transactions all result in land fragmentation and spatial scattering of the fragmented land. Below is a summary of some of the negative consequences of land fragmentation.

## 2. IRRIGATION AND LAND CONSOLIDATION

### 2.1 Large Irrigation Projects

Our country has a surface area of 78 million hectares. 28 million hectares of agricultural land, 8.5 million hectares of irrigable land. 3,94 million DSI of the irrigated land, 1.29 million of the GDRS, 1 million hectares of the public water, 6,23 million hectares of land are irrigated. While 43% canal is classic in 2016, 89% of the ongoing irrigation system in 2016, 7% in conventional system and 4% in canal. It is a fact that from 2000 onwards it is a rapid transition towards closed pipe system. Although the closed pipe system has a high initial cost of installation, the lifetime of the irrigation system is longer and the water usage is also economical.

irrigation institution		
DSİ	3,94 mil	%63
GDRS	1,29 mil	%20
Public Water	1,0 mil	%16

Table1. Total Irrigation Areas in Turkey

During the construction of large irrigation projects, a land consolidation project is mostly implemented by DSI or TRGM institutions. While irrigation projects are being prepared, they are planned according to the land consolidation criteria. The aggregation and irrigation construction can be carried out in this way with minimum coordination. The medium size 10-15 thousand hectares irrigation and land consolidation project takes 3-4 years.



Figure 1. Mardin Main Irrigation Channel by DSI

Within the scope of Southeast Anatolia Project (GAP) ; By the end of 2015, a total of 475,067 ha (45%) of the total was irrigated by 417.814 hectare of DSI and 57.253 ha of TIGEM. Construction work is continuing on 159,738 hectares of land. Approximately 475.000 hectares of underground project construction works are continuing under GAP. Land consolidation projects within the scope of GAP are carried out by TRGM.

Since 2004, DSI has opened a total of 1.376.815 hectares and an annual average of 135 thousand hectares of irrigated land. Investments in large irrigation works depreciate the facility by providing added value to the country's economy within 5-6 years.

In addition, irrigated agriculture and gross national agricultural income are five times higher. According to the data of the year 2011, the average gross national agricultural income in the case without project before irrigation was 112 TL / da, it was 655 TL / da after irrigation.

	By Year	fields opened for irrigation by DSI
1	2004	113.563ha.
2	2005	123.235 ha.
3	2006	99.698 ha.
4	2007	87.442 ha.

5	2008	72.536 ha.
6	2009	83.305 ha.
7	2010	81.387 ha.
8	2011	107.906 ha.
9	2012	119.081 ha.
10	2013	171.081 ha.
11	2014	182.417 ha.
12	2015	135.164 ha.

Table2. fields opened for irrigation by DSİ

DSİ General Directorate evaluates the candidate irrigation projects according to the following criteria while establishing the Investment Program: • Farmers have irrigation requests • Land is efficient • Water resources (dams or ponds) are ready • Irrigation can be done • Aggregation has been done. Projects that provide all of these criteria are called "5 Star Irrigation Projects".

## 2.2 Principles Of Preparation of Irrigation Projects and Adaptation Block Planning Criteria

While preparing the irrigation projects, the main criteria such as topography of the land, soil structure, geological structure, not entering the zoning area are taken into consideration. The main boat line is prepared at a certain slope. Excessive digging is taken care not to enter the fill. The main goal is to make the tailor and backhoe ducts not as extremely fragile as to follow the field boundaries but as long straight lines. This will reduce construction costs.

In the preparation of an irrigation project, the area where a hydrant can be irrigated is called the theoretical parcel. The California system has 4 to 8 hectares and the sprinkler system has 16 hectares. In the western regions, the plot sizes are in the range of 0,5-1,5 hectares. The parcels are 3-4 hectares in the land. Irrigation theoretical plot area is very high. If a hydrant is planned to exit from 1-4, 18-21 farmers will want to get water from a hydrant in projects that are built without consolidation. It does not meet the expectation of the farmers. More frequent intervals with hydrant planned, irrigation theoretical plots 2 hectares will be eligible for property ownership. In order to be able to detect this, cadastral maps have to be used as a base in the digital environment.



and to consult with farmers who have already been unionized. Irrigated plain ova can be collected within the rugged farmland in other topographical aspects.

Rating map significance: Turkey to DSI soil 70%, 20% and yield of the location creates a map with ratings of 10%. In the rating committee, the muhtars and the two land financiers will participate as principal members. 15 days in the village hangs out. You have 15 days to appeal. At this stage, farmers do not fully participate in the scoring map. After the parcel was announced as a hanging, I was told that my land was very small. "The place I go with my landmark score is not really different." It is better not to have excessive transitions in land rating scores.



Figure3. Balikesir Manyas LCP irrigation and drainage system buildings by DSI

Some factors that affect grading can change positively after 5-6 years after land consolidation and field development services. Drainage problem can be positively changed with drainage canal, with stone aggregates, with less coral land, with amphibious land, with amorphous triangles after consolidation, as rectangular parcels, with pathways without parcels stabilized. However, the legal legislation in our country is registered and after the new title is given, it is not possible to make the re-rating and correct the difference in the right.

#### 4.2 Stress of Migration

It is observed that 54% of the population migrated to the city from 1985 to 2018. This ratio is around 32% in the villages where land consolidation is done. Some farmers do not live permanently in the countryside, only to return to the village in summer and make a harvest. The environment also works in other jobs in the districts and provinces. In some villages, there is no workforce to work in the village due to migration to the city, and seasonal workers are working. Immigrants to the city are experiencing problems of adaptation in their first years and are living their rural life.

easons for migration to the city,

- that the land is too small to make a living,
- high costs such as diesel seed fertilizer,
- the development of agricultural machinery and the ability to work with fewer workers,
- High labor costs,
- Marketing problems,
- Field borders,
- Unemployment,
- The fact that the land has been torn apart by the legacy of heritage,
- Inadequate health services in villages,
- Inadequate infrastructure services in the villages, - Migrating to study at university,

#### **4.3 Resolving Property Problems**

The decline in legal litigation related to property after land consolidation is observed. In the past, there were border litigation and problems with a total of 15 neighboring plots of 6-7 fields. When there is only one field in the new situation, there will be only 2 neighboring lots. In some cases there is no problem when the neighboring parcel is siblings, parents are close relatives

Since there is no way to go to their own land before land consolidation, there are big problems to go to court with other field owners. Likewise, there may be problems between the neighbors in terms of water-sharing. After land consolidation, each parcel will have a stabilized covered road. The closed pipe system will fill the water by irrigation. Prior to land consolidation, most of the technical problems, such as the stock quotes in the cadastre, the area in the cadastre and the error limit of the title deed area are overcome by land consolidation.

#### **4.4 Effects of Heavy Urbanisation**

Rural areas are under stress of urbanization, mostly the agricultural areas of villages those are close to cities. Unfortunately, the areas those are subjected to the tight stress of urbanization has been decreases due to the the enforcement of the soil protection law since 2005, however needs with respect to residential areas and reasoning the migration phenomenon is still threatening these rural areas.

#### **4.5 Changes in Land Use**

With the use of irrigation by land consolidation, yields of farmers doubled or tripled per year in much of the consolidation areas. After accomplishment of land consolidation projects there also an intensive increase in greenhouses, vineyards, poultry farms, fruit gardens can be seen. During the dry area farming the cereals such as barley and wheat are dominant, but when these areas are subjected to irrigation, the vegetation turns to products such as corn, sunflower, beet, cotton. The market price of lands are increased by at least 40% due to consolidation and irrigation.

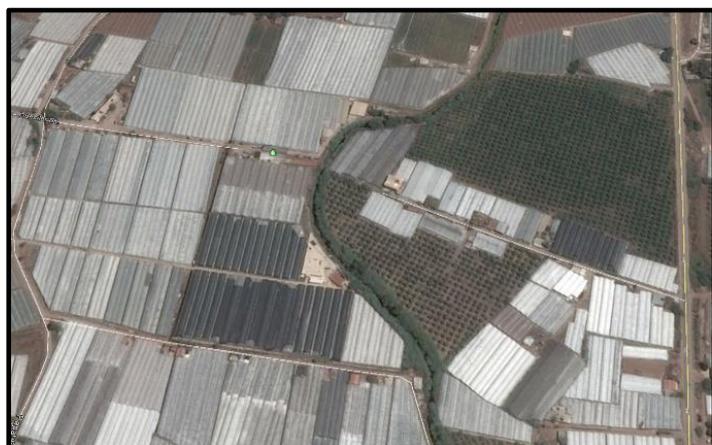


Figure4. Greenhouses and orchards from Antalya/Finike (Kumluca)

#### **4.6 Reconstruction of Village Centers and Related Infrastructure**

After land consolidation, most of the villagers wishes to improve their infrastructure services such as sewage, paving stones, parks and other recreational needs. It is not very easy to re-built or reconstruct the 35 thousand villages at once especially when it is considered that the financial cost of this scale. In many villages, with respect to the increase agricultural income and its result, the wealth bring in from irrigation and land consolidation over the years, landowners having better insights on aesthetic appearance of their houses and environment they live in.

#### **4.7 Wishes of Farmers which has to be in Monitoring and Evaluation Survey Questionnaires**

As same as World stats, in Turkey, the average age for the farmers providing livelihood from agricultural laboring has risen up to above 45. In the last century, it is still vital to find a solution for the rapid population growth against the decrement in agricultural areas and pollution of water and soil resources. On the other hand, farming as a labor intense job is not so popular for the young population who wants better jobs and lives in cities. All these are drugging humanity a real deadlock: the food crisis.

Land consolidation as a toolkit; is just not meant only reorganizing cadastral pattern and building up brand new irrigation services in the field, beside these it's an opportunity which can improve farmers' economic situation. For the sake of projects and pleasure of farmers, getting information by hearkening them to plan their future is quite necessary. Past experiences showed it hard way especially when people are forced to something that they do not agree on. From these aspects, Survey questionnaires are quite definitive metrics for measuring the pulses of society in general or individually.

In addition, various requests for the survey questionnaires to be prepared at the preliminary interviews with the farmers. Mainly topics have to be discussed can be collected under following headings in order to improve the social and economic conditions of the farmers before and after the land consolidation.

- Even for the accomplished land consolidation projects, it is again disintegrated due to the inheritance due to the fact that those who died in recent years. The land is exiled with heritage. The heir of the farmer must continue to engage in agriculture without dividing the land with the State loan.
- Completion of in-field development services such as open and closed drainage, stone collection, stabilization roads, shoveling, land reclamation after the completion of the land consolidation project,
- Land consolidation projects should be integrated projects. Land use plans should be implemented together. Paste plant, chicken integrated facilities, etc. free industrial incentives and alternatives to increase the economic income of the farmer.
- Willingness to 2nd land consolidation implementation,
- Willingness to voluntarily take-off or expropriation (by the State) of small parcels which are inappropriate for farming, especially for the landowners and shareholders who lives in cities with no farming activity and sales to active farmers,
- Researchs on marketing convenience and trend products, or building up cold storage depots,
- Willingness for the establishment of Boards and unions (Water Boards, Farmer Associations)
- Inquiries on increasing agricultural subsidies,

- Willingness to reclamation of pastures and construction of pasture improvement projects, and subsidies for animal husbandry,
- Creating alternative business areas,
- Farmer Educations by qualitative courses
- Improving infrastructure services such as drinking water supply, sewage network,
- Taking precautions to prevent erosion,
- Precautions for Natural diversity preservation to provide richness in rural life,
- Green corridors made by planting trees next to roads built by land consolidation,
- Social facilities such as bicycle path, recreation picnic areas, forest areas, health services, cinema, cafeteria etc. should also be done. The social life of the village should be enriched.
- Restoration of the cultural heritage of the village,
- Improvement of water and soil resources, protection of environmental values,
- Construction of the necessary land for industrial and construction purposes in non-agricultural land

## **5 . SUMMARY AND CONCLUSIONS**

To conclude; Land consolidation is not just the preparation of new parcellation plans. It is one of the major components of rural development. The social component of these projects which are mostly rely on the wishes of local people are important as well as the technical sides.

Turkey is awakening to new horizons by learning from its past. This declaration will guide future land consolidation projects in line with the monitoring and evaluation report prepared.

## REFERENCES

Demirel Z, Rural Soil Arrangement, ISBN 975-8289-62-4 Yıldız Teknik Üniversitesi Basım Yayın Merkezi,1997, İstanbul

Ersan, H. 2015 October, Developments Achieved by Southeastern Anatolian Project (GAP) Action Plan, 3rd National Irrigation Systems Symposium. Ankara

Keles, M. 2015 October, Projecting Principles of Irrigation Networks, 3rd National Irrigation Systems Symposium, Ankara

Küsek, G, 2013 October Multipurpose Land Consolidation Practices in Turkey, National Soil and Water Resources Congress.Tokat

Satana,S 2017 March The Turkish Experience In Consolidation Of Irrigated Land Productivity And Efficiency Implications, Washington

Sert A, 2015 October, Benefits of Interoperability of Irrigation and Drainage Construction Projects with Land Consolidation by DSI and Coordination between Institutions, 3rd National Irrigation Systems Symposium, Ankara

Sert A, 2012 May, The Role of Land Consolidation Projects in Land Use Plan, 2nd National Irrigation and Agricultural Structures Systems Symposium, 2012 May.İzmir

## BIOGRAPHICAL NOTES

05.01.1974 was Born In İzmir

1994 graduated in Yıldız Technical University (Geodesy and Photogrametry en)

2005 graduated in Yıldız Technical University (Geodesy and Photogrametry Ms)

1998-2005 have worked in GDRS ( Genel Dirertore Rural Service)

2005-2007 have worked in GDAR (Genel Dirertore Rural Service )

2007-2018 have been still working in DSİ (DSİ General Directorate of State Water Works

---

Social and Economic Monitoring and Evaluation of Land Consolidation Projects After Application (9258)  
Atakan Sert, Reha Metin Alkan, Ali Riza Ceylan, Onder Karagoz and Cuneyt Vanli (Turkey)

FIG Congress 2018

Embracing our smart world where the continents connect: enhancing the geospatial maturity of societies  
Istanbul, Turkey, May 6–11, 2018

## CONTACTS

Atakan SERT

DSİ General Directorate of State Water Works

İnonu Boulevard No: 16 C block Bakanlıklar

Ankara

TURKEY

Tel. +905353685301

Fax + 903124544205

Email: atakanka74@gmail.com, [atakansert@dsi.gov.tr](mailto:atakansert@dsi.gov.tr)

Web site:

---

Social and Economic Monitoring and Evaluation of Land Consolidation Projects After Application (9258)  
Atakan Sert, Reha Metin Alkan, Ali Riza Ceylan, Onder Karagoz and Cunevt Vanli (Turkey)

FIG Congress 2018

Embracing our smart world where the continents connect: enhancing the geospatial maturity of societies  
Istanbul, Turkey, May 6–11, 2018