Spatial Data Model Design for the Need to Identify Green Property Rights

Tugba MEMISOGLU and H. Ebru COLAK, Turkey

Key words: Property; Green Property Right; Ecological Site; Cadastre 2014; Cadastre 2014 and Beyond; Turkey

SUMMARY

Turkish cadastral system is based on well-founded basis cadastral systems. Especially with the development of digital cadastre, data of cadastral parcels have been digitized, thus, access to a lot of information about the parcels has become easier. However, the studies show that the information about the restrictions on the cadastral parcels is not available in digital environment, access can be obtained by examining the land registry records and these restrictions are not handled within a proper system. It also shows that although these restrictions are in the land registry records, their restrictive nature is not fully set to a standard and does not fully define the use of green property rights. In Turkey, when the restrictions on cadastral parcels are examined, it is seen that these are registered within the framework of easement rights / limited real rights. However, it is seen that records where parcel usage is defined, records of green property rights associated with cadastral parcels and records describing the restricted and protected ecological areas corresponding to the cadastral parcel unfortunately not found. Therefore, there arises a need to identify this area as a single whole.

International Federation of Surveyors (FIG), in 2014, which is the year of realization of the Cadastre 2014 vision, has published another study that assesses the impact of this report and includes new insights for the post-2014 period. In the "Cadastre 2014 and Beyond" report called the future of the cadastre; a report item has been published about ecological boundaries or green property rights. In short, with this item, emphasis has been given to the need defining green property rights and designing a model based on ecological boundaries in defining these areas. In light of this information in this declaration, since the restrictions of cadastral parcels are not defined in detail in these records and cannot be digitized in Turkey, the framework of a model will be examined in which important constraints on cadastral parcels will be determined. In particular, in this study, climate and ecological boundary determination using GIS, it will be considered within a certain standard and the framework of the need to develop the spatial data model design for defining green property will be examined.

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1. INTRODUCTION

Land is one of the most important resources that people need since its existence. With this aspect, it stands out as the most important building block of the cadastre concept (Tudes and Biyik, 1994; Kaufmann and Steudler, 1998). All innovative pursuits based on the development of cadastre reveals its importance to handle the land which is the building block of the cadastre with different approaches to ensure the highest level of use. Land is called cadastre and the first thing that comes to mind when it comes to land is cadastral parcels that are subject to property (Kaufmann and Steudler, 1998). Therefore, it expresses that the innovative cadastre approach is directly related to cadastral parcels. Cadastre's change and progress with innovative approaches directly affects the changes in the cadastre parcels owned by people. In this context, the most important innovative development affecting cadastre parcel is to create more qualified parcels.

Although the Cadastre 2014 vision, which aims to contribute to the future cadastral system visions by identifying the missing aspects of the cadastral system, is sufficient within the scope of cadastral foresight projections, it cannot fully meet the creation of parcel qualities. In this respect, the necessity of addressing the new vision in the context of managing the land for 2014 has emerged, this has led to the introduction of a new trend today, with the concepts of 'fit for purpose cadastre' and 'land rights and continuity of registration' (Kaufmann and Steudler, 1998).

At the FIG congress held in 2010, Australian scientists published articles on the role and structure of the future cadastre as “Cadastre 2014 and Beyond” (Yomralıoglu et al. 2003; Lemmens, 2010; 2010a). Within the framework of this vision, studies on determining and defining ecological boundaries or green property rights are pointed out (Bennett, 2014). Therefore, with the proposed vision framework, the emphasis is strongly made revealing a new definition in cadastral structure, thus creating more understandable cadastral parcels and identification of ecological boundaries or green property rights with inventory that can be protected.

From the statement of defining the green property right, within the scope of this study, it is suggested to make the inference of defining property uses and restrictions by defining basically qualified cadastral parcel. In short, it is the identification of the parcels that the right to property is discussed in detail, it is possible to reach the details of cadastre plots in protection oriented applications completely, quickly and easily and it is possible to access the restrictions on the location, if any, from the land registry information. Thus, conveniences will be provided to in applications for the realization of healthy land policies, in situations that will constitute a basis for planning, fit for purpose cadaster applications and at the point of accessing information on the cadastral parcel.

In this context, the researches give importance to the determination of the ecological boundaries and the climatic boundaries accordingly in order to define the green property right and to obtain qualified land information. So the owner of the property could benefit from a high level of property, for the production of areas that require climatic and ecological protection and the determination of property boundaries accordingly will be able to access information about cadastral parcels. Besides, in any planning situation, it will be very easy to be able to access information quickly and that all these are presented on the system as a whole. In addition, access to qualified land information on property is not only by looking at the land registry records, it will be provided easier and faster via coordinated systems and as a result, a new quality or identity will be given to the cadastral parcels.

2. AIM OF STUDY

The purpose of this study is to consider a spatial data model design to provide spatial descriptions of ecological boundaries that have special features and should be protected, to take into account the climate limits, which are an important part of ecology and by associating them with the cadastral parcels. Thus, a work will be carried out to meet the aims of developing usage restriction policy. Geographical Information Systems (GIS) technology provides important advantages in responding to these needs and producing models. Under normal conditions, analyzes that are planned to be carried out are carried out with more than one operation step through these software and the result is achieved. Since GIS software is multifunctional software, helps the user to provide the analysis they want to perform quickly and dynamically through personalized interfaces. Therefore, in this study, considering the advantageous aspect of GIS technology, the interface model design, which will define parcel qualifies depending on the climate-ecological boundaries, is discussed. Interface to be developed is in the form of a model interface designed in GIS technologies, which enables dynamic definition of parcel qualifies definition based on climate boundaries and ecological boundaries.

In the first stage on this interface to be produced, determination of climate boundary will be realized. With the meteorological station points that record climate data in the pilot region, holistic climate boundary maps of the pilot region to be selected can be produced. In the second stage, by using land use, vegetation, protected areas, soil, flora-fauna, natural protected areas, biodiversity, wildlife borders etc., it will be able to identify areas that need to be protected ecologically and that will serve planning. At the last stage, the interface design will be handled one by one, where climate borders and ecological borders will be overlaid with the cadastral parcel, and qualified parcel definitions will be made.

2.1. Cadastre 2014

Cadastre; is defined as public inventories where the property data of a land, region or country whose borders are determined according to a certain measurement method are recorded and arranged within a system (Kaufmann and Steudler, 1998; Yomralıoğlu et al., 2003). Cadastre from the day it was discovered, undergoes change and development and shows

development in the cadastral system on which it is based. The cadastral system towards the end of the twentieth century has begun to be handled differently and is trying to be developed with the development of technology, the emergence of new visions and models (Kaufmann and Steudler, 1998; Van Oosterom et al., 2006; Enemark, 2010; Enemark, 2012a). Especially in recent years, studies such as multi-purpose cadastre, Land administration Domain Model, Land Management Model, Cadastre 2014 declaration and Cadastre 2014 and Beyond that plays a role in the change of cadastral structure. Cadastre 2014 is the vision of how the cadastre will evolve and what will be the new developments in the cadastre system by the 7th Commission at the 20th International Federation of Surveyors (FIG) Congress held in 1994 (Yomralıoğlu, et al. 2003; Lemmen, 2010). According to this vision, all restrictions and restrictions on the land should be laid out legally, and the distinction between land registry and cadastre should be eliminated and cadastral maps should be defined with dynamic based spatial data models (Kaufmann and Steudler, 1998; Kaufmann, 2004; Yomralıoglu, vd. 2003).

2.2. Cadastre 2014 and Beyond

Although the cadastral base currently considered within the scope of the Cadastre 2014 vision is sufficient within the scope of the forecasts, the necessity of addressing the new vision in the context of managing the land has emerged after 2014. This has led to the introduction of a new trend today, with the concepts of 'fit for purpose cadastre' and 'land rights and continuity of registration'. This new vision framework, called the "Cadastre 2014 and Beyond" vision, is the vision framework that emphasizes the need to consider the social and technological dynamics that will affect land management with a future-oriented planning in the next 20 years (Yomralıoglu et al., 2003). At the FIG congress held in 2010, Australian scientists published articles regarding the role and structure of the cadastre in the future as "Cadastre 2014 and Beyond (Beyond Cadastre 2014)" (Yomralıoglu et al. 2003; Lemmens, 2010; 2010a). Highlighted in these articles; cadastral approach is to be addressed that is taking into account the measurement accuracy, having an object oriented structure, deals with 3D and 4D cadastre, able to work in a standard structure in both national and international context and determining ecological boundaries or green property rights. In this declaration, a spatial model design has been created and presented in which a qualified parcel can be defined to help define the green property right for Article 6, which is expected by the vision of Cadastre 2014 and Beyond.

3. SPATIAL DATA MODEL DESIGN

3.1. IKEKONIP Interface Model Design

Model interface design that is planned to be made is a model (IKEKONIP) design that is presented over the interface to be developed in GIS software. This model design helps define an automated green property by evaluating spatial data together and as a result, and ultimately it is a design that ensures the cadastre parcel to be qualified. This model (IKEKONIP) supplies to determined climate boundaries by climate classification methods; to determined

ecological boundaries by evaluating the climate and other important criteria together and as a result, cadastral parcels that need to be protected are defined (Figure 1).

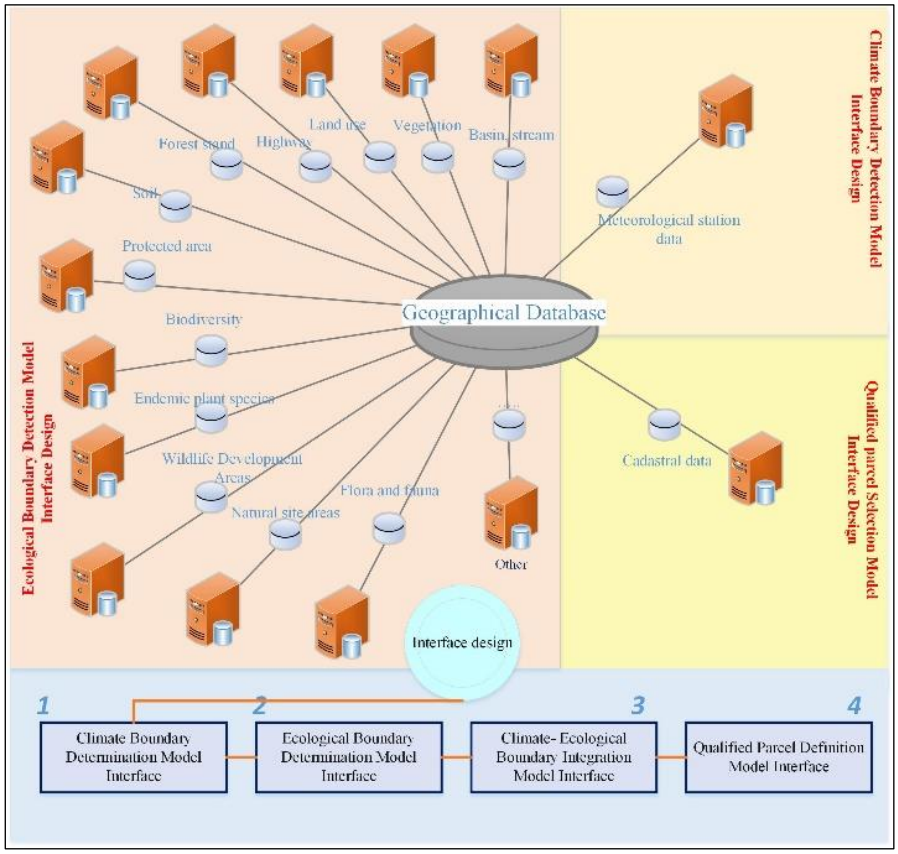

Figure 1. IKEKONIP Interface Model Design

IKEKONIP model consists of four sections. The first is the determination of climate boundaries, the second is the determination of ecological boundary, the third is climate-ecological boundary integration, and the fourth is the defining the quality of the parcel. Through this interface, users can perform analyzes both individually and in connection with each other. Different tools have been created to carry out these analyzes and are integrated into the IKEKONIP. The application stages of the IKEKONIP interface model are as in Figure 2.

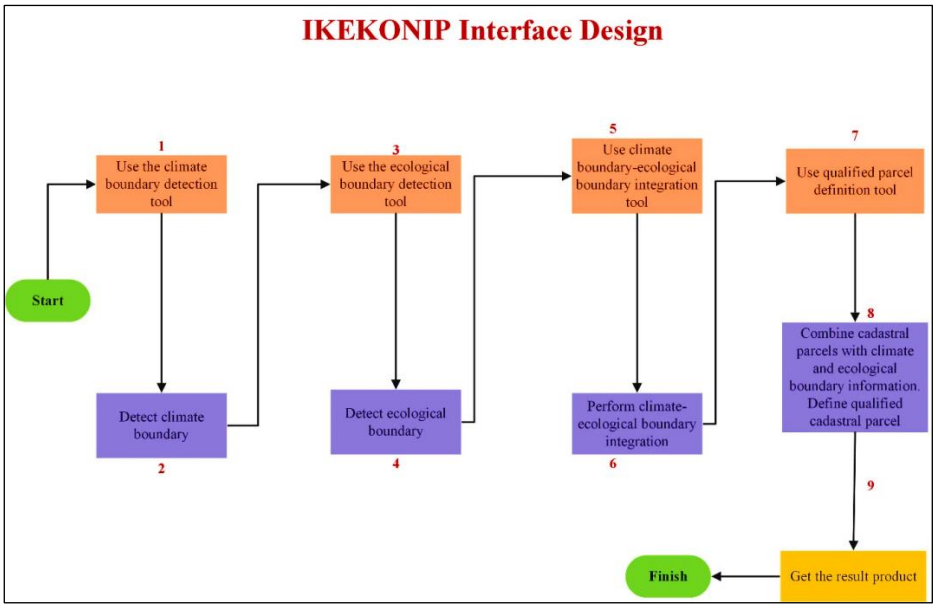

Figure 2. IKEKONIP interface design stages

3.2. Climate Boundary Determination Model Interface Design Application Stage

The climate boundary determination is the first part of the designed model. Through this designed interface, the user can choose any of the methods that he wants to make climate boundary determination. It can access the analysis results by defining the parameters suitable for the method of choice. In this section, climate classification methods for climate boundary detection are selected and integrated into the model interface (MGM, 2017). Model interface operation to be performed for the spatial data of climate boundary determination stage is shown in Figure 3.

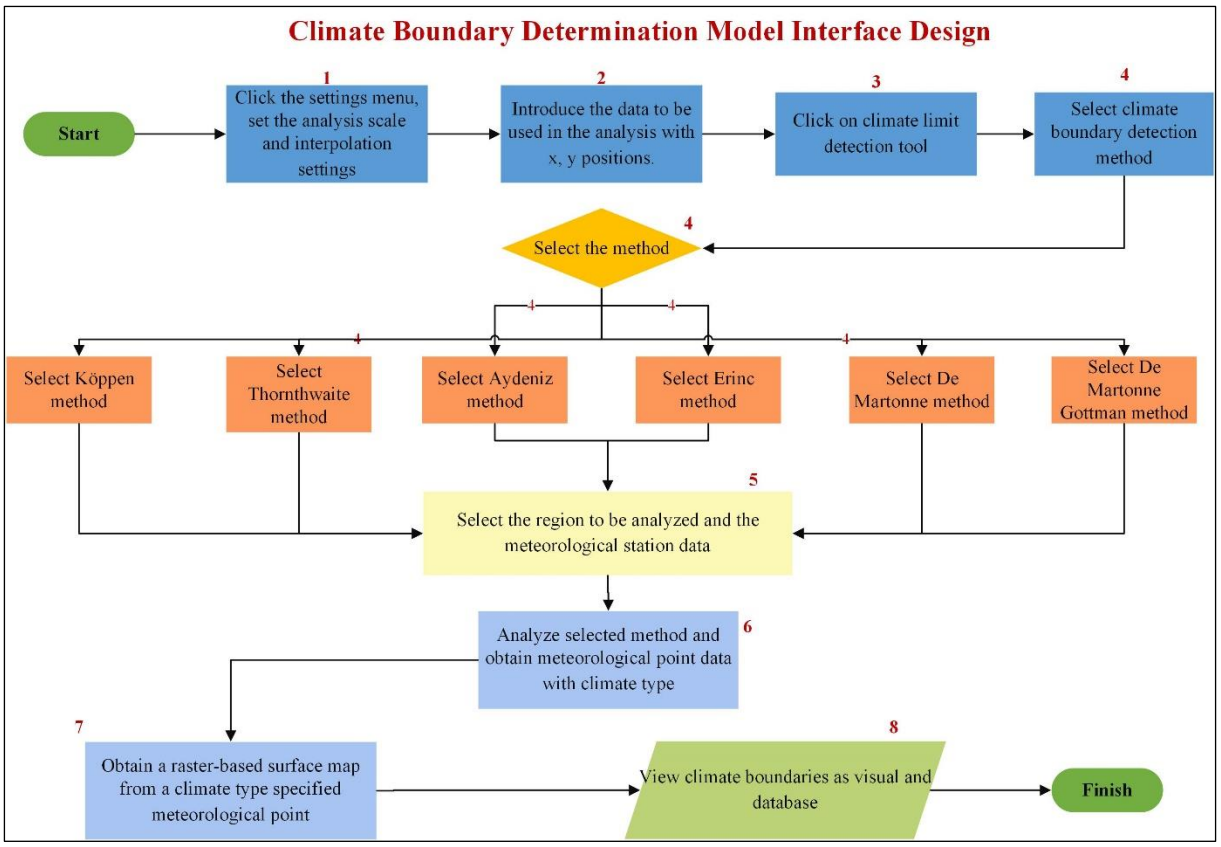

Figure 3. Climate Boundary Determination Model Interface Design

3.3. Ecological Boundary Determination Model Interface Design Application Stage

The ecological boundary determination stage is the second part of the designed model. Through this designed interface, the user can classify by selecting the spatial data to be defined ecologically and can classify by selecting the attribute information. By combining all the spatial data that it has classified, in a single pixel format, the resulting product can obtain a surface raster map. Model interface operation to be performed for the ecological boundary determination stage is shown in Figure 4.

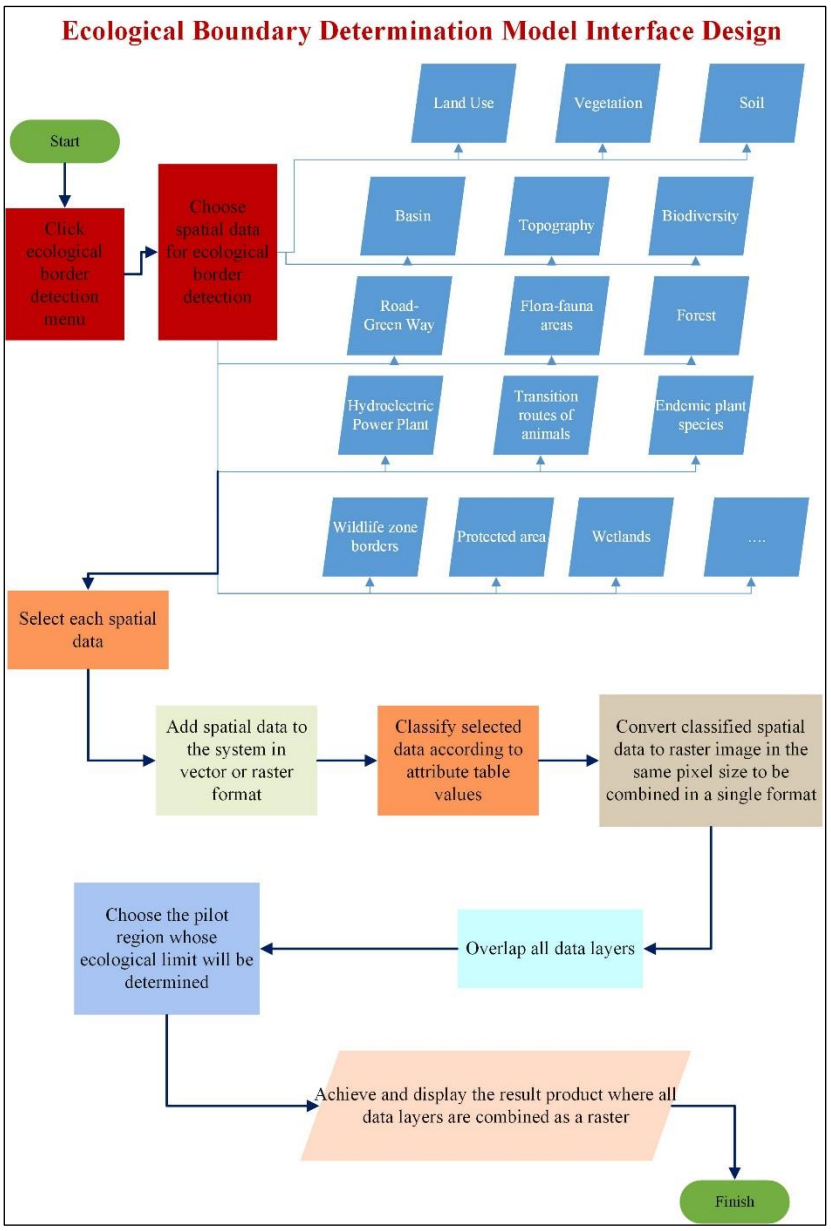

Figure 4. Ecological Boundary Determination Model Interface Design

3.4. Climate- Ecological Boundary Integration Application Stage

Climate-ecological boundary integration is the third part of the designed model. Through this designed interface, the user can combine the climate boundary map produced with the ecological boundary map in the same pixel format and classify it by producing the resulting product map. Model interface operation to be performed for the climate-ecological boundary integration stage is shown in Figure 5.

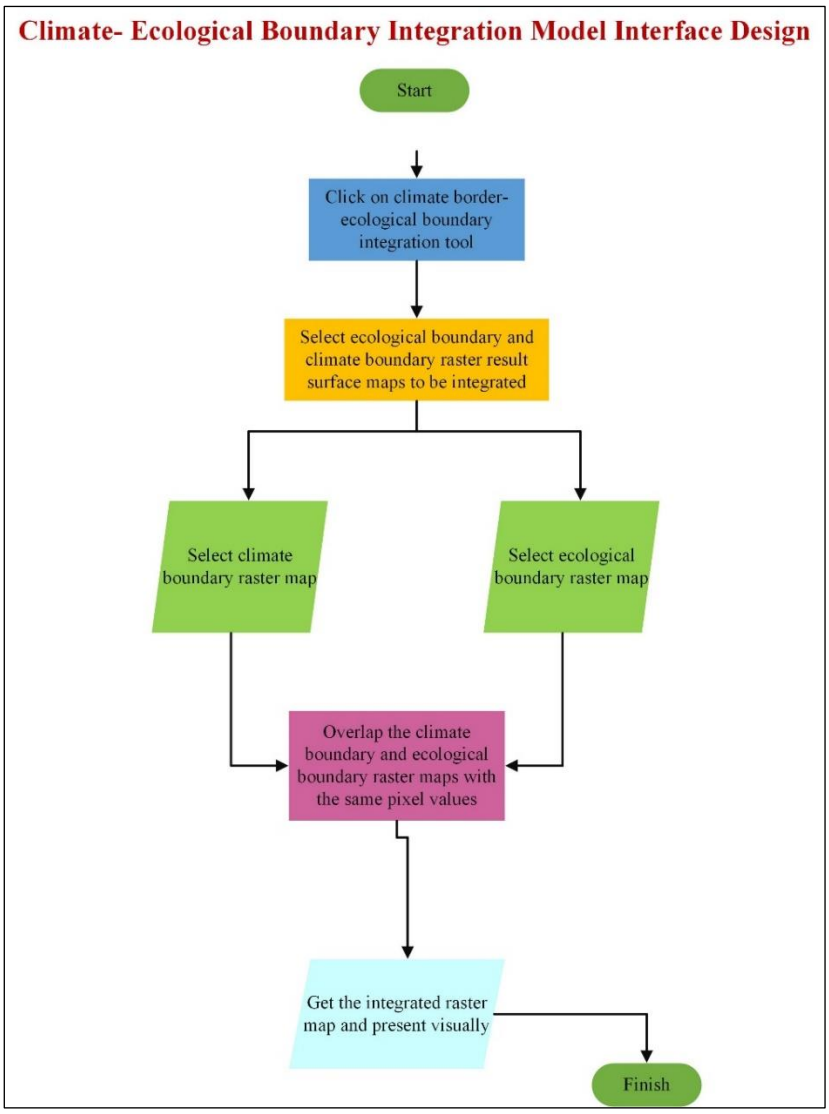

Figure 5. Climate- Ecological Boundary Integration Model Interface Design

3.5. Qualified Parcel Definition Application Stage

Qualified parcel definition is the fourth and final application part of the designed model. Through this designed interface, the user can produce the final surface map by matching the integrated integrated surface raster map obtained in the third step with the cadastral parcel. Thus, the definition of regions that change in the cadastral parcel can be realized. Model interface operation to be performed for the qualified parcel definition stage is shown in Figure 6.

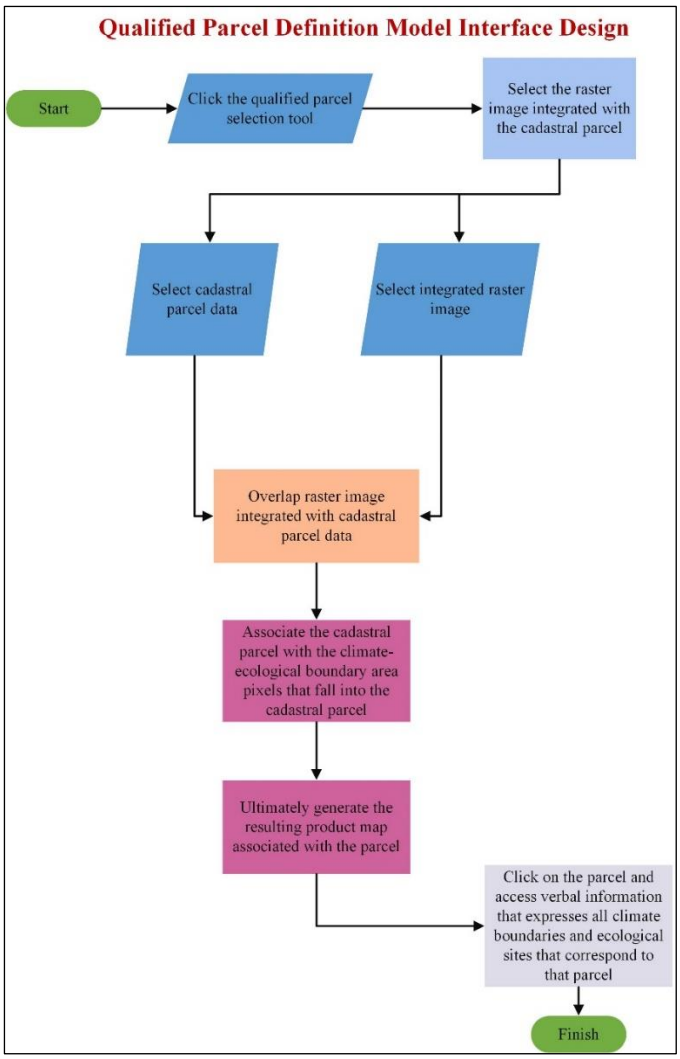

Figure 6. Qualified Parcel Definition Applicaiton

4. CONCLUSION

In Turkey, information on cadastral parcels is handled in two different structures, such as land registry information and cadastral information. Therefore, the property owner cannot access simultaneously many written registered information that both the geometric shape of the terrain and the existing restrictions / constraints. However, in case of any situation related to property, it is important that all existing limitations, restrictions, along with the geometric dimension of the property can be accessed quickly and easily. In this study, the interface spatial model design, in which qualified parcel definition depending on climate-ecological boundaries in accordance with GIS technology will be defined, is discussed and modeled. Using these models, the interface spatial model design will be carried out and analyzes can be performed over an automated interface. This study includes a scope for the purpose of defining the green property rights stated in Article 6 of Cadastre 2014 and after, and a spatial

data model was designed with an exemplary application. This interface also developed can provide backing to the work plans of the National Climate Strategy.

5. REFERENCES

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BIOGRAPHICAL NOTES

H. Ebru ÇOLAK is Associate Professor at Karadeniz Technical University (KTU), Turkey. She graduated from the Department of Geomatics Engineering at KTU in 2001. She received her PhD degree with thesis entitled "Spatial analysis of cancer cases by Geographical Information Systems in the Eastern Black Sea Region of Turkey" in January 2010. Her research interests are Geographic Information Systems, Health GIS, Geostatistics and Land Management.

Tugba MEMISOGLU is a Research Assistant at Karadeniz Technical University (KTU), Turkey. She graduated from Department of Geomatics Engineering at KTU in 2007 and she became a master engineer from the same department. She is now PhD student in Department of Geomatics Engineering at KTU. Her interests are Geographic Information Systems, Environmental GIS, Geostatistics and Land Management Applications.

CONTACTS

H. Ebru COLAK
Karadeniz Technical University
Faculty of Engineering
Department of Geomatics Engineering
Trabzon / TURKEY
Tel: +90 (462) 3773657
Fax: +90 (462) 3280918
e - mail: ecolak@ktu.edu.tr
https://aves.ktu.edu.tr/ecolak/

Tugba MEMISOGLU
Karadeniz Technical University
Faculty of Engineering
Department of Geomatics Engineering
Trabzon / TURKEY
Tel: +90 (462) 3773654
Fax: +90 (462) 3280918
e - mail: tugbamemisoglu@ktu.edu.tr