The Reliction in the Finnish Cadaster - A Very Finnish Problem

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SUMMARY

During the last glacial period, much of northern Europe was covered by ice sheets which were often couple kilometers high. The weight of the ice caused the surface of Earth to sink. After the ice melted, Earth's surface started to bounce back. In Finland the Earth's surface is still bouncing back. This bouncing back creates vast reliction areas at Finnish coast-lines. In Finland, a country with long Baltic Sea coastline, 188 000 lakes and 179 000 islands, the effects of this phenomenon to cadastral surveying are known to every cadastral surveyor.

In the Finnish cadaster, reliction areas are primarily owned by the owner of the water area. One exception to this are so called detached reliction areas. Before the year, a 1911 manmade reliction area could be form so that the the owners of the area were those who made it. These areas were for many decades outside the cadastral system and ownership papers could be in someone's drawer. Last of these areas have just recently been formally put into the Finnish Cadaster.

Common cadastral problem with reliction areas in Finland occur with summer cottages. It is very common that in front of a summer cottage there is reliction area. This problem is solved in Finland through an expropriation of the reliction area. In recent years a new problem with reliction areas has become apparent. In many rural lakes there is growing interest to raise the water surface of the lake. Now there is need for a reverse reliction expropriation procedure.

SUMMARY (in Finnish)

Viimeisen jääkauden aikana suurinta osaa Pohjois-Eurooppaa peitti paksu mannerjää, joka oli usein kilomertin tai kaksi paksu. Jään paino painoi maan pinnan alaspäin ja jään sulettua maan pinta alkoi palata aikaisemmalle paikalleen ja tämän seurauksena tapahtuva maan kohoaminen jatkuu yhä. Maan kohoaminen luo laajoja vesijättöalueita Suomessa. Maassa jossa on pitkä Itämeren rannikko, 188 000 järveä ja 179 000 saarta, tämän ilmiön vaikutukset maanmittaukselle tunnetaan kiinteistötoimituksia tekevien maanmittausinsinöörien parissa.

Suomalaisessa kiinteistöjärjestelmässä vesijätön omistaa useimmiten vesialueen omistaja. Tästä on yksi poikkeus: erilliset vesijätöt. Ennen vuotta 1911 kuivatuksen kautta syntyneeseen vesijättöön saattoi saada omistusoikeuden kuivattaja siitä riippumatta omistiko hän mitään kiinteistöjä. Nämä alueet olivat vuosikymmeniä kiinteistöjärjestelmän ulkopuolella ja omistuspaperit saattoivat sijaita vain jonkun maanomistajan pöytälaatikossa. Viimeisiä erillisiä vesijättöjä muodostetaan juuri nyt tiloiksi kiinteistörekisteriin.

jättöongelma koskettaa erityisesti kesämökkejä. Monen kesämökin edustalla on vesijättö. Suomessa on mahdollista lunastaa vesijättö. Viimevuosina ongelmaksi on noussut järvien pintojen nostohankkeet. Nyt tarvitaan käänteinen vesijätön lunastusmenettely.

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1. POST-GLACIAL REBOUND IN NORTHERN EUROPE

Post-glacial rebound (sometimes called continental rebound) is the rise of land masses that were depressed by the enormous weight of ice sheets during the last glacial period, through a process known as isostatic depression. Post-glacial rebound and isostatic depression are different parts of a process known as either glacial isostasy, glacial isostatic adjustment, or glacioisostasy. Glacioisostasy is the solid Earth deformation associated with changes in ice mass distribution. The most obvious and direct effects of post-glacial rebound are readily apparent in parts of Northern Eurasia, Northern America, Patagonia, and Antarctica. However, through processes known as ocean siphoning and continental levering, the effects of post-glacial rebound on sea level are felt globally far from the locations of current and former ice sheets. (Wikipedia 2017)

In Europe post-glacial rebound is most felt at Northern Baltic Sea coastlines but the effect is also apparent on the inland waters of Finland. Rebound is fastest in the Oulu-Kemi region where rebound is 9 mm per year. Similar effect is in southern Finland but the effect is smaller attaining 3 to 5 mm a year. There is some debate if the reason for rebound weight of the glacial ice sheets or just movements of the continental shelves. Whatever the reason, the effect is still apparent in Northern Europe. (Wikipedia 2017)

2. RELICTION IN THE FINNISH CADASTRE

2.1 Normal reliction

Basic principle of the Finnish Cadastral Surveying is the stability of the boundaries and boundary markers. Boundaries do not change their places with geographical or land use changes. Of course there is one exception to this rule. When a whole continental shelf moves, all borders move with it, but because this movement is similar in all around Finland and the relative position of boundaries do not change, this movement can be ignored in cadastral surveying, although it poses problems with GPS measurements.

In areas where the rising of land can be seen, it is necessary to define the exact limits of property. In Finland, the "new land" is legally the property of the owner of the water area, not any land owners on the shore. Therefore, if the owner of the land wishes to build a pier over the "new land", he needs the permission of the owner of the (former) water area. Usually the owner of the water area is the partition unit of the landowners of the shores, a collective holding corporation. (Wikipedia 2017)

In the Finnish Cadaster, a so called normal reliction is formed due to geographical changes, mainly by post-glacial rebound or overgrown coastline vegetation. Human made new land is not generally considered normal reliction. There is one exception to this rule: detached reliction.

2.2 Detached reliction

During the 1700s and 1800s the Crown wanted to promote creation of new croplands. Old lake bottoms proved to be great croplands, they were level and the soil was good for agriculture. So the Crown promoted drying of lakes through drainage. During the 1800s in Finland legislation was such that if some people wanted to dry the lake they had to apply for a license from the governor, but after permission was granted, participants could dry the lake and get ownership to bottom of the lake although they did not own the surrounding estates or water area. This kind of legislation was in effect until the year 1902 and even after that you could lower the water level of a lake if you had a license until the year 1911.

This kind of detached reliction created a problem for the Finnish Cadaster. People who participated in drainage projects could get ownership of land without the normal confirmation of title or cadastral survey. Ownership was based on so called "shovel shares" and could be based on solely on license of the governor and contract of the participants. There were no legal requirements to get title to land so these areas remained outside the cadastral register.

Although after the year 1911 creation of new detached relictions was stopped, old detached relictions remained outside the cadastral register. In the year 2015 the Finnish Parliament enacted new legislation to abolish detached relictions and their formation to normal cadastral units. In the beginning of the year 2015, the National Land Survey of Finland created the Reliction Team. One major task of this team is the formation of detached relictions to normal cadastral units. It is estimated that this work would continue up to the 2020s.

3. CADASTRAL SURVEYING AND RELICTION

3.1 Land Consolidations

Basement of Finnish Cadastral system are Basic Land Consolidations which were finalized between years 1764 and 1960 throughout Finland. Basic Land Consolidations created cadastral units and their dimensions. In many cases water areas were not included to Basic Land Consolidations and coast lines were measured poorly if they were measured at all. To correct different problems with the old Basic Land Consolidations, cadastral surveys such as Rearrangement of Basic Land Consolidation and after year 1916 the New Land Consolidation were introduced. All these three types of Land Consolidations are base of the definition of cadastral boundary next to coast the line.

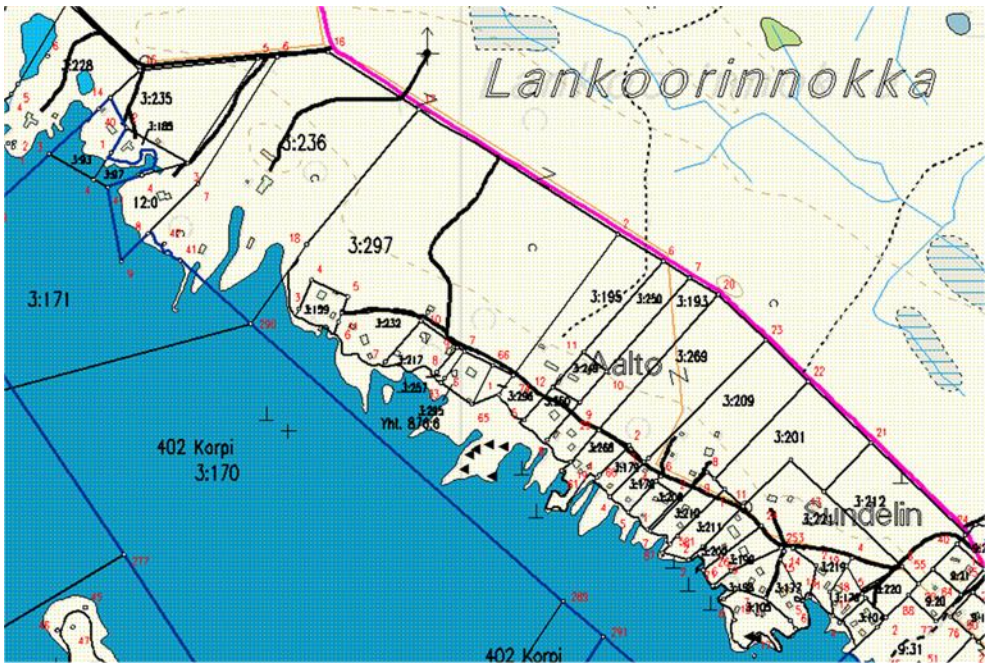
In general Finnish Cadastral map is considered as an index map. Information of the boundary location is variable. In centers of large cities coordinate information is exact and location information could be used directly. In rural areas this is not the case. Many times coordinate information is inaccurate and could have an accuracy of only 20 meters or less. Many times coastline boundaries are worse and they are inaccurate, therefore the definition of the boundaries of a reliction area starts from the most recent Land Consolidation. Border he boundary next to the so called hard land is considered formed in the Land Consolidation. If the borderline next to water was measured poorly in the old Land Consolidation, you can get help from the knowledge of the year of

the Land Consolidation. The water level at the time could be calculated and coastline sketched from the contour information.

Old Land Consolidations give only basement to the location of the coastline border. After the Land Consolidation there normally have been many different kind of cadastral surveys next to coastline. Parcellings, border definitions and expropriations of reliction could have altered situation and they must be considered accordingly when you examine location of reliction.

3.2 Parcellings and border definition surveys next to reliction

Especially in the 1900s the parcelling of estates became general and common practice. Next to coastline summer cottages were parceled out from the old farms. Before 1997 parcellings were carried out such a way that the possibility of reliction was seldom considered. If the reliction was small and embankment of the old coastline was not noticeable, reliction was surveyed into the created plot although coastline border was not officially defined in the survey. New legislation and guidelines of the National Land Survey changed the situation and after 1997 the coastline border must be defined officially in a parcelling next to the coastline. Parcellings done before 1997 could create some problems in the cadaster, because it is possible that before 1997 parcelling was done such a way that the plot is totally in the reliction and if argument rises over definition of the coastal border, it could happen that some plot totally loses its area to reliction if the coastal border is defined higher than the plot itself. Although this problem is been noticed, not many legal disputes have arisen over the subject.



Picture 1. Cadastral Map next to Baltic Sea in Pori. Reliction is noticeable. In one plot expropriation of reliction has been done. Scale about 1:5000.

Old boundary demarcation surveys and other surveys which have defined coastal boundaries do not present such a problem in cadaster as parcellings, although if you want to define the place of the coastal boundary, you have to research documents of all surveys to find out the location of the coastal boundary. Similar situation is with the expropriation of reliction surveys.

3.3 Expropriation of reliction

In the earlier Finnish legislation there have been some possibilities to expropriate reliction, but with land division act of 1950 expropriation of reliction was defined exactly and in the Real Estate Formation Act of year 1997 changes were small and process stayed mostly similar. The owner of the land or owner of the water area next to a reliction can apply for expropriation of the reliction and the application is done to the National Land Survey. The Expropriator is always owner of the plot in the land side of the coastal boundary. Cadastral Surveyor and two trustees made up body which decides if the legal requirements of expropriation are met and what the value of reliction is.

Legal requirements for expropriation of reliction are that reliction makes difficult the usage of expropriator's estate or reliction can be practically used only jointly with expropriator's estate. Also it is easier to expropriate if the current owner of the reliction is common water area and more difficult if owner of the reliction is a private individual.

One major difficulty in expropriation of reliction is the valuation of reliction. Normally valuation of land in Finland is relatively easy task. Information of all land purchases are stored in the National Land Surveys register and they are publicly available to the public. When valuating reliction area there is one difficulty: there are no real markets of reliction areas and reliction purchases are very rare happenings in Finland. So theoretical considerations come more in focus. Aulis Tenkanen's Ph.D. study (1983) established valuation principles to valuation of reliction. Basic idea was that value of reliction is roughly 30-50 % of expropriators estates land value per m^2 and expropriator's plot is valued without buildings. This principle prevailed until Supreme Court Decision of 2000 which appeared to rise compensation level. Value of reliction have remained subject of debate among cadastral surveyors and remains that still.

4. NEW DEVELOPMENT

4.1 Reverse reliction expropriation

In year 2011 parliament in Finland gave new Water Law which included several improvements and changes to legislation. One major change was in the process of lake restoration. Because in Finland the value of lakes as places of recreation have risen compared to the need for agricultural land, lake restoration is becoming more popular in Finland. Old lakes that were dried to get more agricultural land have now been dammed to raise the surface level of the lake. This new development affected the new Water Act which included new rules for the lake restoration situation.

In new Water Act Land Consolidation was ordered to be compulsory if land of the coastal properties would fall under water in the restoration of the lake. In Land Consolidation the coastal boundary would be moved to the real coastal line and land that lost area would be compensated

with shares in the water area. First this drastic order seemed out of proportion and it was feared that expenses of lake restoration would become too great. After nearly 20 real cases the worry disappeared. Most cases were such that restoration of lake raised surface only to reliction. Most Finnish lakes have reliction so land of the estates next to lake was seldom put under water.

The only cases where Land Consolidation was really considered were cases were expropriation of reliction had been done earlier and therefore the coastal boundary was much lower than it otherwise would have been. In these cases Land Consolidation would be in practice reversed reliction expropriation. From cases examined during new Water Act only in one case Land Consolidation would be considered necessary and while writing this text not one Land Consolidation has yet been started because of the New Water Act.

Although problems with lake restoration was avoided Water Act raised to the surface one problem: the inaccuracy of the cadastral border next to water. In the Ruotsivesi Case this problem was dealt with new methods.

4.2 Ruotsinvesi Case

Ruotsinvesi is an old Baltic Sea gulf which was dammed in 1965 to produce a fresh water reservoir for the city of Uusikaupunki. If you want to drive or cycle around it the route is 48 kilometers long, but the fragmentation of the coastline and many islands make coastline next to Ruotsinvesi about 200 kilometers long. In 1965 gulf was dammed and the surface of Ruotsinvesi has remained about the same level since. So the water has risen with surrounding land mass. In all other places on the Finnish coastline of Baltic Sea land has risen from water, but here the water level followed the land mass.

In 2015, the District Water Court ordered the city of Uusikaupunki to survey and list all land owners who have suffered from damming of Ruotsinvesi by watering their lands. Court decision was that a land owner who owns land next to Ruotsinvesi up to the 1 meter level from the water surface should be compensated. This demand produced real difficulty. Cadastral information of the coastline boundary was inaccurate and the coastline boundary in the cadaster was unreliable. It was known, because the last Land Consolidations in the area were done between 1905 and 1915, they were the basis for the location of the coastline boundary. After 1905 there have been many cadastral surveys and it was known that before 1997 majority of parcellings were done without checking the place of the boundary next to water. Lots were many times measured up to coastline without taking any notice of the reliction area which was formed between the years 1910 and 1965. This meant that where those parcellings were done, the cadastral index map was inaccurate. Also maps of the old Land Consolidations were not so accurate about coastline. In 1910, boundaries next to the sea were not important and the coastline boundary was many times only sketched on the map.

Picture 2, Ruotsinvesi reservoir, scale about 1:100 000

To solve this problem, the City of Uusikaupunki asked help from consulting and engineering company Pöyry Oy and from the National Land Survey of Finland. Work was divided in such a way that the National Land Survey was responsible for production of cadastral boundaries and Pöyry Oy was responsible for providing detailed maps and area catalogs according land owners up to the one meter limit from the surface of Ruotsinvesi reservoir.

Improvement of cadastral border information started with definition of the height of the coastline borders which were defined in old Land Consolidations between 1905 and 1915. Because Ruotsinvesi reservoir's surface was halted to level of the year 1965 and ascension of land mass in the coastline of Finland is roughly 0.6 centimeter in a year, you could say that coastline border would be at the height of 30 to 40 centimeters from the reservoir's surface. Contour line was calculated to this height from recent laser scanning information from the area using QGIS-program and this line was compared to maps of the old Land Consolidations. Places were official border definition survey or reliction expropriation had been done earlier could be exempted from examination because there the cadastral index map was accurate. Still, picking out these place was

hard work because direct cadastral information would not reveal these places but you had to examine all old surveying documents.

Picture 3. Map and aerial photo from same location. In upper picture background is from map of the old Land Consolidation and in lower picture from recent aerial photo. Thicker black line is old coastline border in cadaster and narrow black line is new contour line from presumed height of the coastline border. In this location determining accurate place of the border proved very difficult. Picture was made by Antti Fager-Pintilä NLS Finland. Scale about 1:1000.

Order of this project came in February 2016 and National Land Survey appointed one cartographer and one cadastral secretary to this task. Cadastral coastline boundary of Ruotsinvesi reservoir area was improved and boundary data was sent to Pöyry Oy which made thematic maps and lists concerning compensations. Project was finalized and materiel send to District Water Court at end of June 2016.

In this project 200 kilometers of coastal cadastral boundary was improved. This took roughly four month's work at NLS Finland. The Finnish Environment Institute (SYKE) has calculated that there is 314 604 kilometers of coastline in Finland (MTV3, 2002). There is not always a cadastral boundary at coastline in Finland, but more often there is than not. So you could roughly estimate that 70% of the coastline there is also a cadastral boundary. From these figures you could also estimate that it would take 367 man-years to improve all cadastral coastlines in Finland.

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