Supplement – IMPACT ASSESSMENT FOR DIFFERENT CRITERIA

3.3.1. Water levels of Rokua

Forestry ditches have changed the groundwater exfiltration patterns of the Rokua groundwater discharge area. How much these changes have actually affected the Rokua water levels is currently under research and remains uncertain. For the MCDA, the best current available information of the hydrological studies was used to assess how the water levels would behave in the following 30 years in different alternatives (table 3). If the current state prevails, the long-term decline of water levels will continue and can cause a water level decline of approximately one meter (from the average value) within 30 years. During dry periods this would cause lower minimum in water levels that could be more drastic than during the dry periods of the 1980s and the 2000s. In Alternative A the long-term decline of water levels is stopped, but water levels would not return to the level preceding ditching. In the Alternative B water levels return to the assumed natural state, on average one meter higher than the current situation. This level is indicated by the shoreline region occupied by the oldest trees. This alternative can be estimated to be less uncertain compared to Alternative A, as there are active procedures aimed at restoring the groundwater exfiltration patterns to a natural state.

3.3.2. Ecological state of lakes and springs

Preliminary studies of the groundwater-surface water interaction in Rokua have pointed that phosphorus is leaching into groundwater from sandy soil, especially when the groundwater has had a long contact time with the sand (i.e. old groundwater). As the clear oligotrophic kettle lakes are groundwater dependent, the risk of eutrophication increases due to water level decline. Risk increases as older groundwater might seep into lakes and increase the proportional amount of

incoming phosphorus. Also, lake water volume decreases due to water level decline, therefore increasing the proportional amount of phosphorus entering lakes.

Another ecological issue is that ditches have dried natural springs, which have formerly acted as the natural groundwater exfiltration locations in the peatlands surrounding Rokua. As they are dry, a poor ecological state currently exists in these spring ecosystems. If ditched areas are restored, springs will most probably return to a more natural state. Spring locations have not been mapped thoroughly and therefore the question of how many springs can be restored increases the uncertainty of this factor. The ecological status of both lake and spring ecosystems are predicted to have a positive impact as a result of implementing alternatives A and B.

3.3.3. Recreational value of second homes

One of the key factors of the recreational value of Rokua are the pristine, clear-watered, oligotrophic kettle lakes. Fifty-three second homes are built on the shores of these lakes and the recreational value of these houses is partially dependent on the shore line. The water level declination moves the shoreline away from the houses and reveals former lake bed areas. This decreases the recreational value of the lake shore as thickets start to grow and the pristine landscape changes. The link between the recreational value of second homes and lake water level was calculated using the VIRKI model. The model was originally developed to calculate the effects of water level variation to property values on lake and river shorelines (Keto et al., 2005). In the case of Rokua, the model was used to calculate how much recreational value decreases if the shoreline recedes from the situation during the year 2008. In 2008, lakes no longer showed significant effects due to previous dry years and water levels were close to the average of the past 30 years. In the current state, water level is presumed to decrease by approximately one meter and this would cause

a shoreline retreat of approximately five to six meters. This retreat would cause an annual decrease in recreational value of 94-145 € for each of the second homes. In 30 years this would mean a 150 000 € to 230 000 € decrease in the recreational value. In alternative A the decline would presumably stop, but as the future level variation is uncertain, the value decrease is assumed to be somewhere between 0 and 230 000 €. In alternative B the water levels should return to a more natural state and levels are assumed to be at the year 2008 situation or above.

3.3.4. Attractiveness of Rokua area

Lakes are also one of the key factors in the attractiveness of Rokua for tourism. Lake level decline might change the landscape and recreational use of lakes. This again might reduce the amount of visitors in Rokua. As the lakes are only one part of the landscape in Rokua, and tourism is not only dependent on lakes, the impact of lake level change is considered to have less of an effect on tourism than, for example, on the recreational value of second homes.

3.3.5. Economic impacts on forestry income

The impacts of the restoration of drained peatland areas on the forest economy were studied by using the exfiltration risk analysis maps (Fig. 3). Watersheds in high exfiltration risk areas were defined as areas where active restoration procedures in alternative B would be allocated. In these areas restoration is presumed to wet the forest and affect tree growth. As the growth potential of the forest is drastically reduced, the income of the forest owner is diminished. Using different input data (different combination sets of available data, Fig. 3) in risk scenario maps (Eskelinen, 2011), the value of income losses in 30 years were calculated to vary from 500 000 € to 2 500 000 €. The change in land value was not taken into account. In alternative A, where the groundwater area is

expanded, defining forestry income loss was more problematic. As the expansion would restrict forestry management practices at some of the areas where the groundwater area is expanded, some new areas might become wet. As this is less certain it was estimated that alternative A would result in only 10 % of the effect on forestry compared to alternative B.

3.3.6. Income loss of peat production

Peat production in the vicinity of Rokua is scheduled to end in 2018. Also, hydrological studies showed that approximately 1% of groundwater discharging from Rokua was flowing from the harvesting area. This emphasized the minimal effect of the harvesting area on the whole Rokua esker hydrology. Therefore, different scenarios are presumed to have only a small effect on peat production. In alternative A peat production may end earlier, in the case that the groundwater area expands to the peat harvesting site. In alternative B a new method is planned for the restoration of the peat harvesting area to prevent groundwater exfiltration to the harvesting site. This again might be more expensive than current methods and reduce income from peat production.