Protecting Aquatic Warbler:
FARMING IN WET MEADOWS AND FEN MIRES

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FARMING IN WET MEADOWS AND FEN MIRES

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Photo: Žymantas Morkvėnas

INTRODUCTION

Fertile flooded meadows of the Nemunas Delta and the seacoast of Curonian Lagoon in Tyrai as well as the species-rich fen mire of Žuvintas Biosphere Reserve are home for one of the rarest migratory songbirds Aquatic warbler (Acrocephalus paludicola) in Lithuania. This modest looking bird, smaller than house sparrow, is protected not only in our country, but throughout the whole Europe. Currently Aquatic warbler breeds only in Belarus, Ukraine, Poland, Lithuania and Germany, whereas a few decades ago these birds also used to breed in Hungary and even in the neighboring Latvia. The rapid population decline encourages environmentalists to take immediate actions to preserve the species for future generations.

Survival of Aquatic warbler is closely linked to activities of environmentalists, scientists and decisions of politicians, but the most important allies of these rare birds are you – local farmers living in the same neighborhood, managing and using these meadows. Why is farmer so important in the life of Aquatic warbler? This very demanding for its habitat bird breeds only in the open and spacious wet meadows and fen mires. Maintenance of these habitats is associated with a farmer, who selects optimal grassland mowing time and environment-friendly mowing technologies; therefore, Aquatic warbler protection is an integral part of the environment-friendly farming practices.

A farmer is very important in the life of Aquatic warbler

Photo: Žymantas Morkvėnas

In cases, when the natural environment preservation presents potential economic losses, the state provides support measures to compensate farmers for losses incurred. This publication contains information about the peculiarities of farming in Aquatic warbler territories and financial support measures for farmers of endangered bird habitats (natural and semi-natural meadows and extensive wetlands), concisely presented in this Lithuanian Rural Development Programme (RDP) for the period of 2014–2020. The purpose of support is to restore and manage the now abandoned Aquatic warbler habitat areas. In this publication, you will find not only the information about the state support measures, but also the matter of the environmental requirements and recommendations on choosing protection measures for Aquatic warbler or alternative agri-environmental measures. This knowledge is of a particular relevance to farmers of the Curonian Lagoon seacoast and Nemunas Delta polders, but no less valuable for farmers of other Lithuanian regions.

Photo: Jūratė Sendžikaitė

NATURE CONSERVATION IN AQUATIC WARBLER TERRITORIES

Why do we have to protect the biological diversity of the planet, if species began to disappear long before man?

Biodiversity is important for many reasons, but especially because it helps to maintain a balance in the nature. This balance has been achieved during thousands of millions of years through evolution. However, due to particularly increased human activities over the past centuries, natural processes in nature have been disturbed: the mechanisms of ecosystem self-regulation (purification, recovery after natural disasters such as fire, flood, etc.) have been broken up. Irresponsible use of natural resources, forgotten ecological laws of the famous American ecologist B. Commoner (1971) „Everything is connected to everything else and Nature knows best"- impoverish biodiversity and do irreversible harm to ecosystems. Reduction of natural ecosystems ultimately causes human-made pollution to have negative effects on the quality of life: reduces vitality and creative activity, causes more and more health problems, severe illnesses or even mutations, and in the future it may become a cause for changes in human genetic code and affect the whole human species.

Biodiversity *– a diversity of all living organisms (plants, animals, fungi, microorganisms, etc.), genes and ecosystems (grasslands, forests, wetlands, water bodies, etc.).*

Ecosystem *(gr. oikos – house + gr. sistema – structure, compound) – a part of land surface or water space, where plants, animals and micro-organisms together with the living environment (air, water, soil) are forming a single entity.*

Species-rich ecosystem is far more resilient and adaptable to environmental changes than those with low species diversity. Loss of even one species or just a temporary decrease in its viability in species-poor ecosystem may seriously disrupt the complex, millennia developing food chain of organisms. Unfortunately, this would have serious consequences on other species of the same ecosystem. Only rich biodiversity ensures that if one part of the food chain activities fails, another comes to aid and will continue to ensure the complete functioning of the whole ecosystem and survival of its component species.

An ecologist of Stanford University (USA) P. Ehrlich explains consequences of biodiversity loss through very simple, but technical Ri-

vet hypothesis. In this model, species are like the rivets on an airplane, with each species playing a small but critical role in keeping the plane (the ecosystem) airborne. The loss of a rivet weakens the plane and causes it to lose a little airworthiness. The loss of a few rivets could probably be tolerated, while the loss of more rivets would prove critical to the airplane's function. Hence, every in nature existing species is certainly an important "rivet" in the "airframe" of the ecosystem.

In spite of the united efforts of all countries to stop the loss of biodiversity, it is rapidly decreasing all over the world. In the history of Earth, natural processes have caused five mass species extinction periods. Scientists warn that humanity can become the cause of sixth species extinction: over the last two centuries, animals on the planet have disappeared much faster than before. Willow grouse, Golden eagle, American mink, Short-toed eagle, Spotted eagle and Brown bear have disappeared in Lithuania over the past century. Scientists also cannot find Peregrine Falcon living in forests anymore.

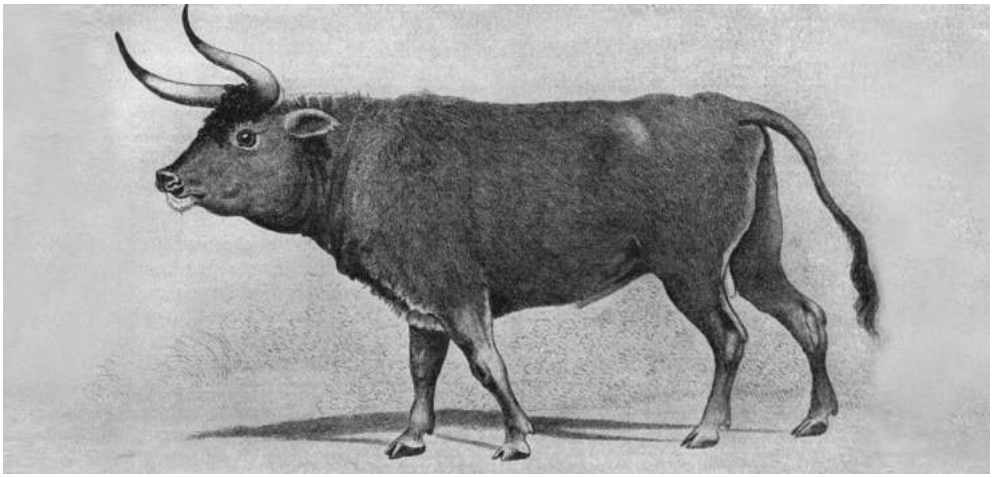
Biodiversity is essential to human well-being: provides food, timber, fiber, many household items, stabilizes the climate (plants absorb large quantities of carbon dioxide and produce oxygen), protects and supports physical and mental health of people (cleans air, water, is a source of medicinal products, improves conditions for recreation, etc.). Biodiversity is not less important asset as agricultural goods or products manufactured by man, although both are necessary in our life.

We have to admit that we are able to understand and explain only a small part of naturally occurring interactions and relations. Not that it would be very difficult, but because we are not able to simultaneously comprehend their abundance and interdependence. Therefore, it is important to learn to live without worsening the situation further, i.e., try to find such forms and methods of activities, which allow to combine economic and ecological needs as much as possible and to save what we still have in our natural environment.

BIODIVERSITY – ECOLOGICAL LIFE SUPPORT SYSTEM

Since the time our ancestors began to actively manage nature by taking advantage of its resources for their well-being, the human race was getting more and more intense in reorganization of natural environment by disturbing the wild-established processes, changing the landscape, breaching or destroying habitats and reducing biodiversity or even leading individual species to extinction. Development of agriculture, increasing number of domestic cattle which needed more and more open pastures has led to decrease in forest coverage and intense hunting in Europe until 1627 caused aurochs to completely disappear. These powerful ancestors of modern cattle used to roam lush pastures of river valleys, mires and flooded forests. Aurochs used to feed on grass, branches of shrubs, trees and their bark, during the autumn and winter their diet was diversified with acorns. At the time, aurochs along with other herbivorous animals were important managers of forests, wetlands (especially sedge meadows) and wet meadows (Van Vuure, 2003). Permanent grazing areas have become more open and meadow birds were able to successfully settle there. Among them a tiny Aquatic warbler, as well as the mighty aurochs, liked habitats of open sedge and wet meadows. Although they lived nearby, fate was much more favorable to the small bird than its giant neighbor – auroch. However, after less than five centuries Aquatic warbler became also threatened with extinction.

Centuries of artificial selection, during which plants and animals that are most compatible with human needs are targeted, has accumulated valuable genetic material for breeding. Eventually, man-made plant and animal varieties has become agricultural object, commodity which is relatively easy to express in monetary value.

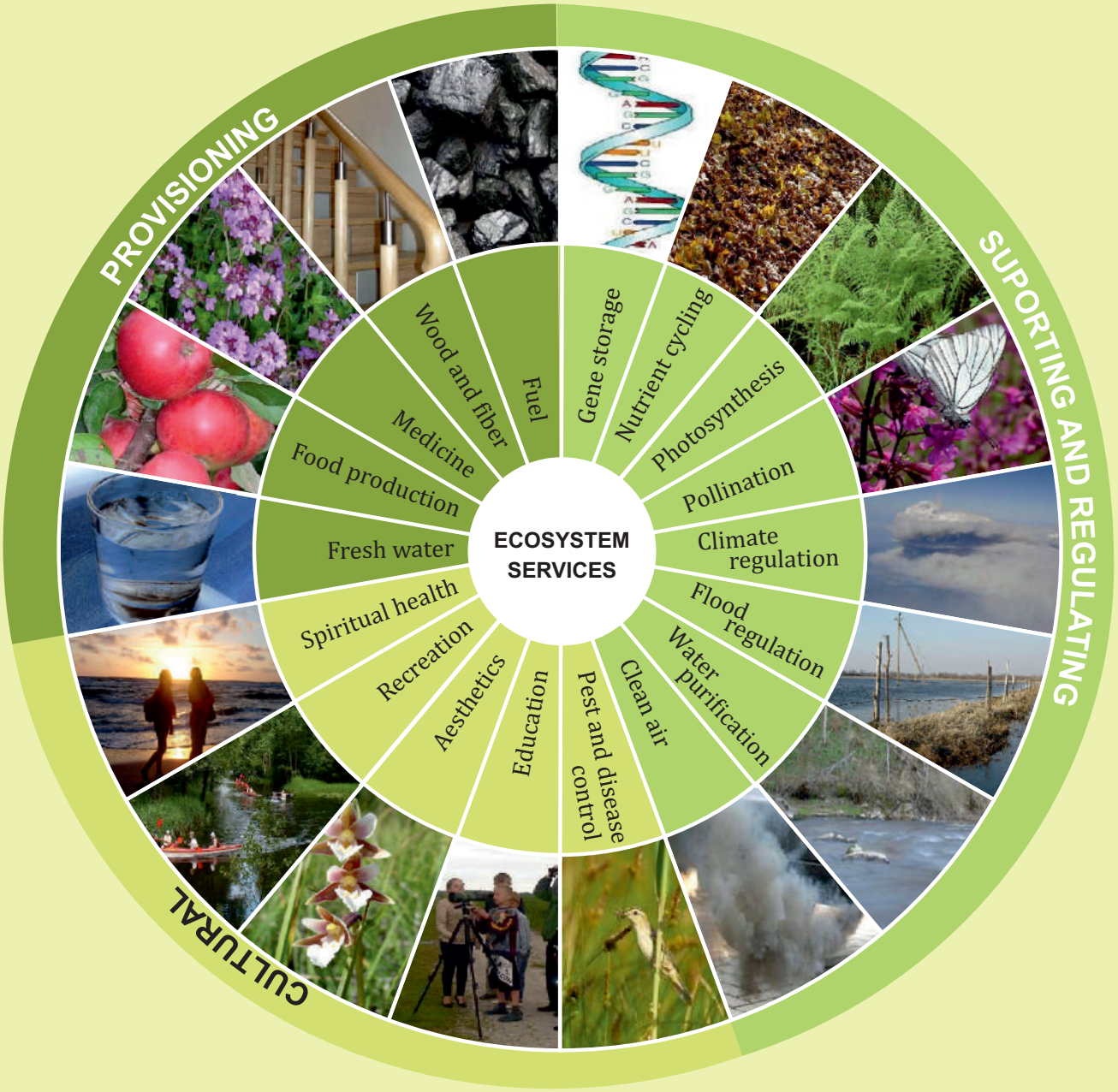


Copy of painting of unknown author from 14th c.

According to the written sources, in the beginning of 15th century aurochs have still roamed forests of Lithuania. In the 17th century current Polish territory the last auroch has been hunted.

ECOSYSTEM SERVICES – GENEROUS GIFTS OF NATURE.

Adopted according to Common International Classification of Ecosystem Services (CICES)



It is considerably more difficult to assess gifts of nature, modernly called ecosystem services. These services include supply of food, drinking water, fuel, fiber, maintain our physical and spiritual healt and gives aesthetic values. Rich biodiversity ensures the survival of the living world, i.e., supports quality of human health adequate living environment (air, water, soil, etc.), stabilizes climate, etc. Unfortunately, sometimes we perceive nature as a luxury rather than a necessity.

Photo: Staffan Widstrand

Natural and semi-natural habitats of exceptional value and endangered plant and animal prevalence in the European Community have been consolidated into a single network of protected areas Natura 2000

NATURA 2000

Photo: Žymantas Morkvėnas

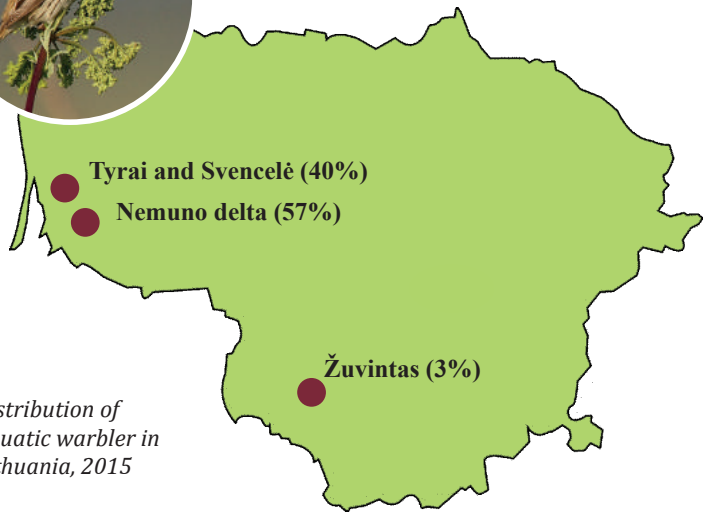
Farming in Natura 2000 sites

Many protected habitats with typical species throughout many centuries have gained today's ecological value and importance for the European community on the grounds that they were used by humans. Therefore, in order to maintain this value, in many cases it is necessary to continue their traditional use. Farming conditions may vary depending on the territory specifics so they should be individually discussed with local farmers. Agricultural activity is limited only in those cases where it is necessary to protect habitats, nesting birds and other animal or plant species of European Union importance from specific adverse effects. For the farmers, who apply or voluntarily take up restrictions on farming activity, which are necessary for the protection of nature values, the European Agricultural Fund for Rural Development disburses compensatory payments that are paid in addition to the direct payments for the declared agricultural land and crops.

Often agricultural activities in protected areas are essential. Survival of semi-natural meadows and pastures in Lithuania is inseparable from extensive agricultural activities – grazing and mowing continuity. It is important to realize that farming in the Natura 2000 sites should consider the needs of nature conservation values but it is important not to forget the needs of people who are living and working in these lands. Human desire to intensify farming is natural because it is usually thought that only high yield can ensure high-income. So, a modern man has to deal with highly relevant issue – how to combine two quite opposite activities: increase productivity and preserve the biodiversity. Ideally, biodiversity of rural landscape can be preserved by not prohibiting the agricultural activities, but instead developing traditional, extensive and environmentally friendly farming, which existed for centuries beforehand and combining it with modern farming technologies.

AQUATIC WARBLER – A SMALL "RIVET" IN THE "AIRFRAME" OF ECOSYSTEM

Currently, Aquatic warbler, a very rare, sparrow-sized bird is one of the ecosystem rivets that wobble worldwide. Over the last century 95% of Aquatic warbler population has disappeared. These species is facing mass extinction because it has very specific feeding and breeding environment needs. Unfortunately, most of sedge fens and flooded meadows have been drained in 20th century Europe; hence, territories that meet the needs of the Aquatic warbler remain low while the rest of territories due to over-intensive use or complete cessation of agricultural activity began to wane. In Lithuania Aquatic warbler breeds only in three areas – eastern coast of Curonian Lagoon (flooded meadows and fen mires in Tyrai and Svencelė), Nemunas Delta (Šyša, Sausgalviai, Alka, Uostadvaris and others polders) and Žuvintas fen mires.



Distribution of Aquatic warbler in Lithuania, 2015

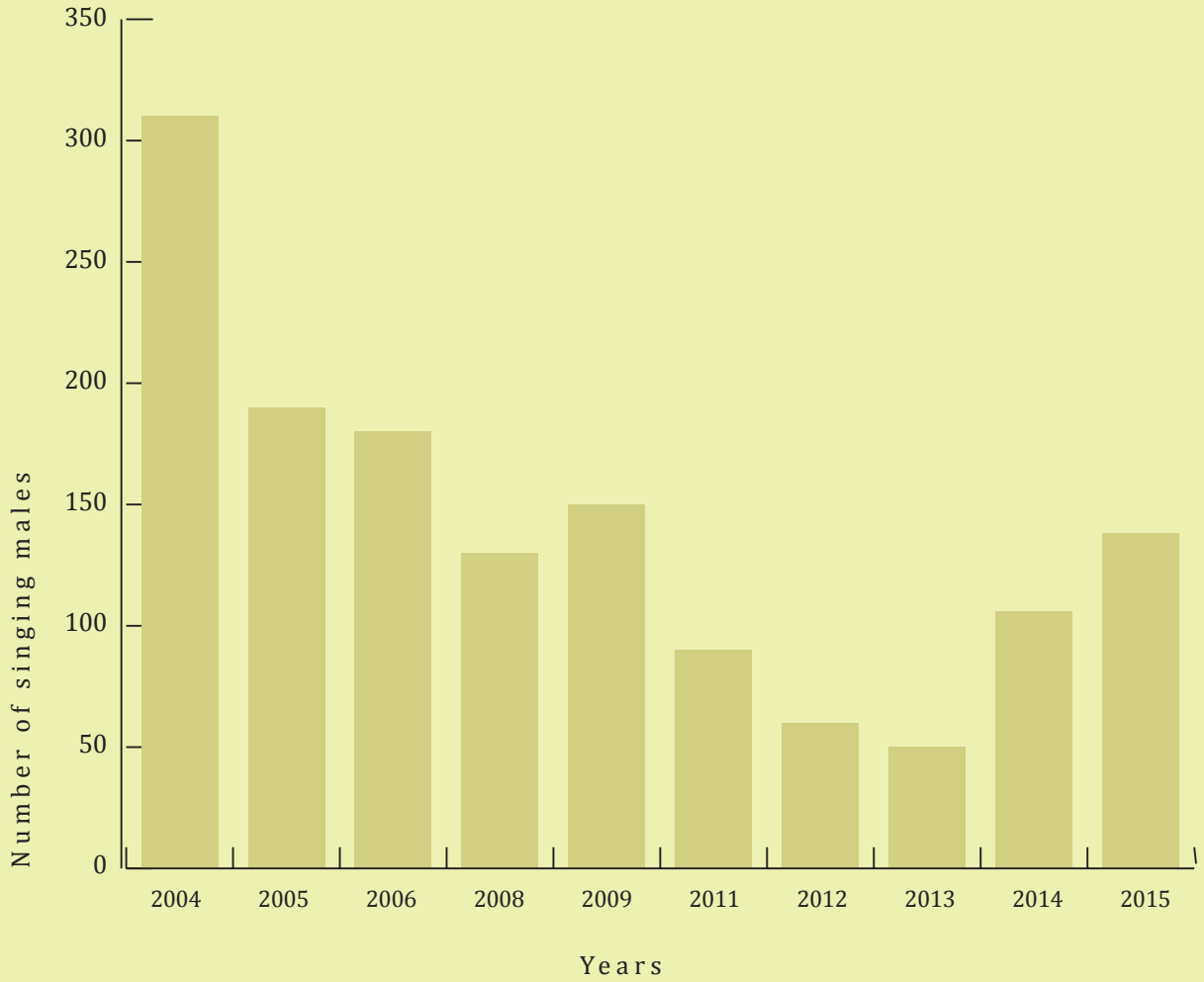
Aquatic warbler observations show that population of these birds is considerably reduced in Lithuania over the past ten years. In 2004, 310 singing Aquatic warbler males were counted in Lithuania, 2011 – 90, 2013 – only 50. The situation slightly improved in 2014 when 106 singing birds were counted. In 2015 (flooded meadows in Alka, Minija Senvagė, Sausgalviai, Šyša, Uostadvaris, Vorusnė polders; Svencelė, and fen mires in Tyrai and Žuvintas) was registered a record of the last five year period in Lithuania – 138 singing males. Rare bird population increase was the result of environmentally friendly farming practices in the Aquatic warbler habitats.

Why only males are being counted?

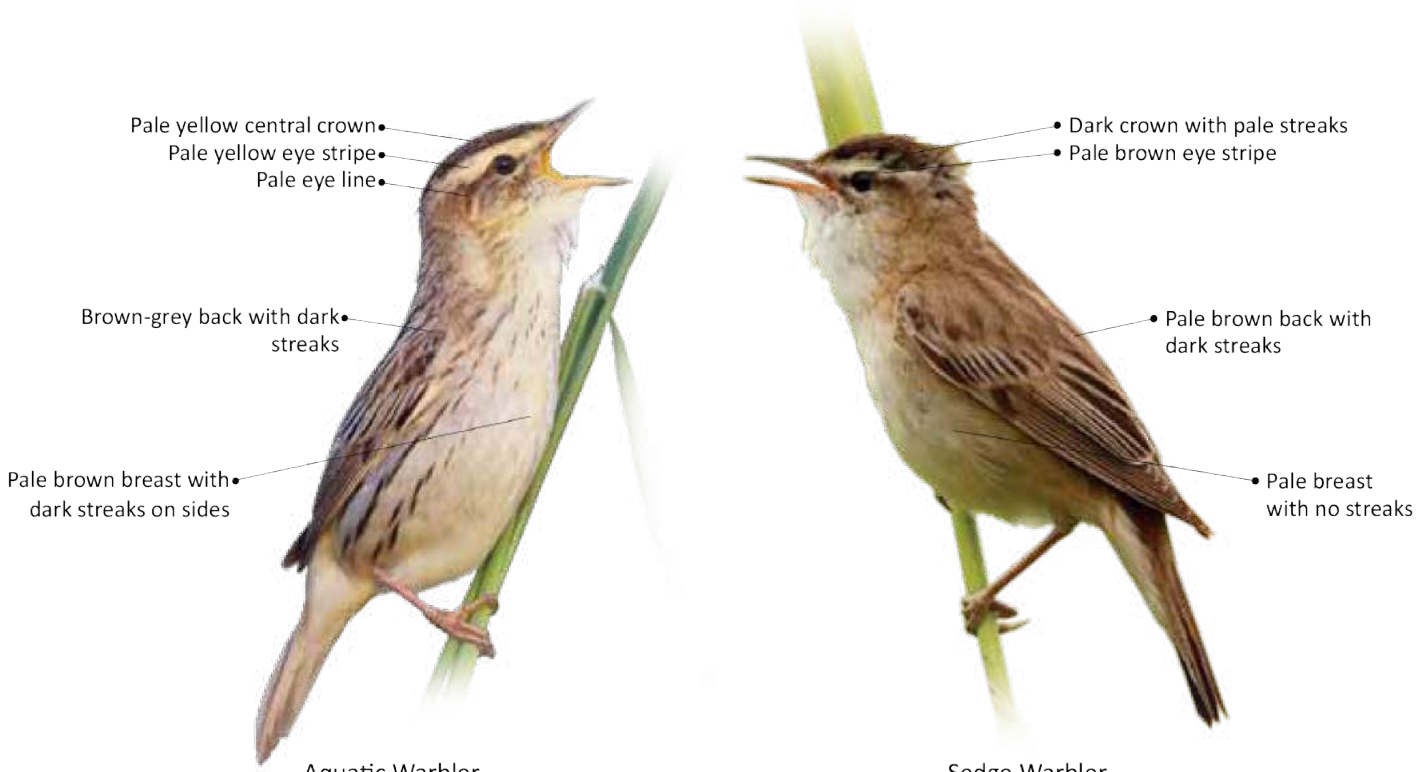
Because it is quite difficult to see the Aquatic warbler but it is much easier to hear it. By the way, only males sing, each of them has their own territory and keeps them vigilantly protected. So, if you hear the Aquatic warbler singing in different areas of the meadow, you can be sure that this is not one and the same bird who decided to show off his voice in a new place. Usually where a male bird sing, one or two females build their nests, and in habitats rich with insects it is possible to find even three nests.

DYNAMIC OF AQUATIC WARBLER SINGING MALES IN LITHUANIA

2004–2015 m.



DISTINCTIVE FEATURES OF AQUATIC WARBLER AND SEDGE WARBLER



How to identify the Aquatic warbler?

This sparrow-sized bird is very similar to the common Sedge warbler. Aquatic warbler differs by lighter coat, lightly bright yellow stripe on top of the head from beak to the back of the head and similar streaks on back over the shoulders. The appearance of both sexes are almost the same. Juveniles that are fully feathered are similar to adults, but their sides are not spotted.

In which countries does it breed?

Lately it breeds only in 5 countries: Belarus, Poland, Ukraine, Lithuania and Germany (irregularly). Till 2011 it was also breeding in Hungary.

Where does it winter?

It is known for science that some of Aquatic warblers fly to West Africa for wintering – to Mali, Senegal and Mauritania.

AQUATIC WARBLER DISTRIBUTION AND MIGRATION ROUTES AROUND THE WORLD

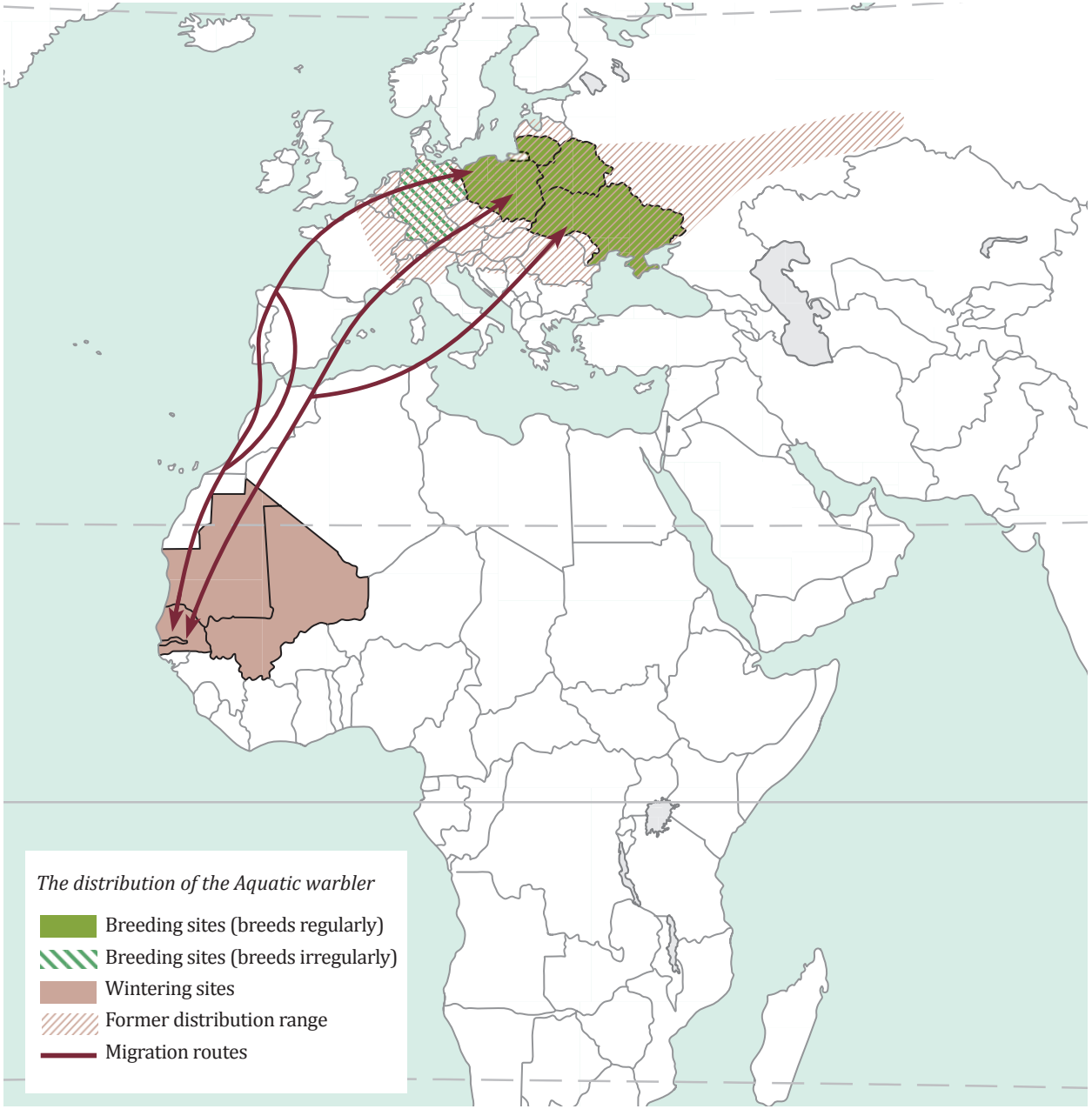


Photo: Žymantas Morkvėnas

Female of Aquatic warbler builds the nest, hatches the eggs and takes care of the brood alone.

How does it live?

Aquatic warblers do not form stable pairs. Females build nests, hatch the eggs (3–6 in one nest) and take care of the brood alone. Therefore, it is important that there would be enough food next to the nest – insects and their larvae, grubs of dragonflies and butterflies, mosquitoes, spiders and other invertebrates. Since there are no couples, females can mate with multiple males, and males – with several females. So, different juvenilles in a brood often descend from several different male birds.

Birds prefer to breed in specific habitats: open and spacious sedge fens or wet meadows where the spring water lies above the soil surface (up to 10–15 cm) and dries only in the beginning of summer. These habitats should cover at least several tens or even hundreds of hectares. Bushes or even small strips of trees, growing along the roads, breaks down the habitat to separate plots of land and makes it less attractive for this type of birds.

How Aquatic warbler is protected?

This passerine species is included into Annex I of the European Union's Wild Birds Directive, Appendix II of the Bern Convention on the Conservation of European Wildlife and Natural Habitats and Appendix I of Bonn Convention on the Conservation of Migratory species of Wild animals as globally threatened species. It is also listed in the Lithuanian Red Data Book as vulnerable, i.e. category 2(V) species (species whose number of populations and abundance of individuals in populations is rapidly decreasing).

Despite the officially recognized Aquatic warbler status as globally endangered species, representative of UK Royal Society for Protection of Birds (RSPB) Mr. N. Schaffer states that *while watching TV and seeing lovely Giant pandas, African elephants or Blue whales we are generally inclined to support the conservation of these worldwide endangered species although many of us have never seen and probably will not see them in nature. But often we forget about these small, gray birds which still live in our neighborhood with 20 times smaller population remaining than the African elephant. This bird does not receive our support and attention simply because it is small!*

Therefore, nature management activities and a series of research studies are being carried out in order to preserve the globally endangered species. Nature conservation professionals and local farmers, who manage and supervise not only the Aquatic warbler breeding and wintering areas but also temporary resting and feeding stops during spring and winter migration, may rely on these studies. It is important to keep the remaining Aquatic warbler areas intact and restore favorable hydrological regime and typical plant cover, i.e. open sedge fens and flooded meadows in the damaged ones. Due to the critical state of Aquatic warbler population, scientists are starting to consider such means of conservation as translocation. When applying this method, young birds from the lively populations are moved to the newly restored habitats.

The experts of LIFE+ project are visiting Aquatic warbler territories in Lithuania.

Photo: Žymantas Morkvėnas

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ENVIRONMENT-FRIENDLY FARMING IN THE AQUATIC WARBLER TERRITORIES

Aquatic warbler habitats are open, spacious sedge fens and wet, seasonally flooded meadows where the groundwater is relatively high (i.e., in spring and autumn water lies in the majority of meadows of the Nemunas Delta polders, and in the beginning of summer the water is just in 20–30 cm depth). Such habitats are dominated by tall, moisture-loving plants adapted to the steady lack of oxygen during constant or temporary flooding. Sedge communities occupy saturated with water soils, Reed canary-grass or mixed Sedge–Reed canary-grass communities occur in slightly drier areas. Condition and productivity of the Aquatic warbler habitats' fertility are closely related to grassland structure, soil properties and moisture, ground water level regulatory options, local meteorological conditions, farming intensity, etc..

RELEVANT PROBLEMS OF THE AQUATIC WARBLER PROTECTION AREAS:

- *Unfavorable hydrological regime during the breeding season. Consequences: not suitable nesting sites due to the excessively high ground water level; food shortages due to the very low groundwater levels;*
- *Intensive farming. Consequences: bird nests with eggs or broods are destroyed due to early mowing;*
- *Termination of agricultural activities. Consequences: habitats become overgrown with bushes and reeds, accumulation of old grass due to lack of management.*

Photo: Žymantas Morkvėnas

GROUND WATER LEVEL CONTROL

In early spring, the ground water is above soil surface in Šyša polder.

Žymanto Morkvėno nuotr.

Ground water level is one of the most important factors that determine farming strategies in wet meadows and fen mires. Where it is not possible to regulate the water level (Tulkiaragė and Minija Senvagė polders, meadows in Svencelė and Tyrai) mowing depends on the natural water level fluctuation.

Aquatic warbler habitats equipped with water pumping stations can maintain optimal ground water level for the sedge-grass, i.e., to keep the water at the depth of 10–30 cm in early summer. Properly functioning polder system gives the opportunity to control hydrological conditions by taking account both, the protection of biodiversity and farming needs. Unfortunately, change of natural processes without sufficient arguments can have negative consequences. Premature and rapid spring flood water removal from the polder is unfavorable for the biodiversity. Of course this is not a problem for farmers since meadows, which turned green early, become a valuable forage source for cattle, which after the winter yearns for fresh grass. By removing the water from polder early you can advance the pasturage and after some time – start making hay. However, this situation is not favorable to the Aquatic warbler because due to the soil moisture shortage in the spring invertebrates (the main food source for these birds) fail to develop and some of them die. So, prematurely drained polder meadows may not provide birds with enough food for their brood since while looking for food the females cannot stray far from the nest. A habitat with small amount of invertebrates may be disastrous for the new brood.

On the other hand, late and slow spring water pumping from the polder also affects the condition of flooded meadows. Soil wetness

Photo: Jūratė Sendžikaitė

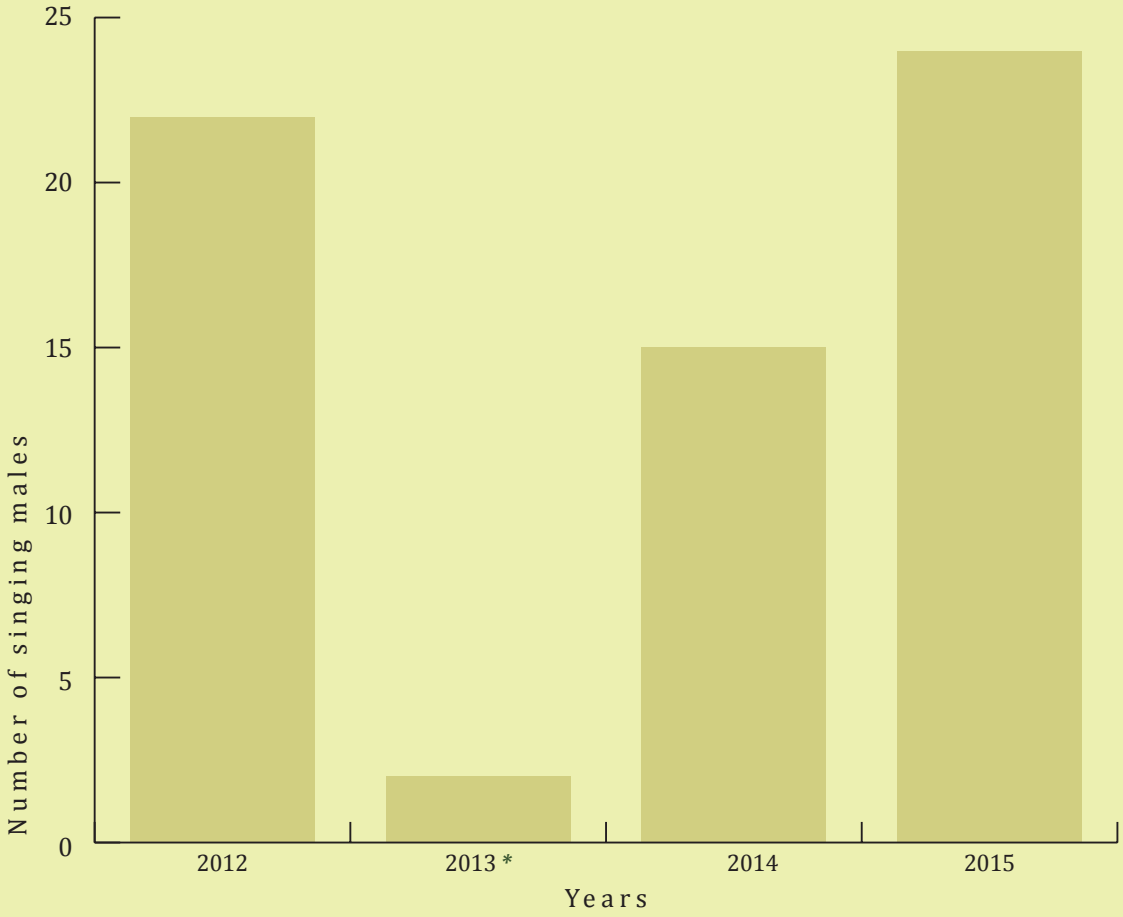
Two-ranked sedge meadows in optimal (A – 2012 June) and surplus (B – 2013 June) moisture conditions in Šyša polder.

and lack of oxygen inhibits the growth of herbaceous plants consequently weakening their development and causing production of significantly inferior biomass than in normal conditions. This is unfavorable to farmers; in addition, not all available machinery is designed to operate in wet soil. On the other hand, birds avoid grasslands that were wet for too long (even moisture-loving Aquatic warbler) because in such conditions the birds cannot find a suitable dry nesting place. After all, these birds do not build floating nests!

The importance of water level regulation in the polder is illustrated by the 2013 year experience when in Šyša polder (Šilutė district) high water level remained until mid-June. The most suitable grasslands for the Aquatic warbler breeding has developed under extreme humidity conditions in the beginning of vegetation, i.e., has been submerged under 7–10 cm thick layer of water for a long period of time. Plants that remained under warm water for too long couldn‘t grow normally so even after the water subsided, grasslands developed slowly and were scarce. Reed canary-grass yield compared with the previous year; decreased by 13–35%, while in sedge communities – 40–60%. Such changes in vegetation are reflected in the Aquatic warbler statistics: In 2012 there were 23 Aquatic Warbler males detected in Šyša polder (i.e. 1/3 of the total population in Lithuania) were counted, then, in early 2013 summer birds have avoided excessively wet polder, therefore only 2 males were observed.

ABUNDANCE CHANGE OF THE AQUATIC WARBLER SINGING MALES IN ŠYŠA POLDER

2012–2015 m.



** – 2013 Aquatic warblers avoided polder, which was flooded for too long*

Pumping station in Šyša polder

Photo: Petras Lengvinas

Regulation of water level in polder could – satisfy the needs of farmers and Aquatic warbler. At present, the main document as the basis of water level in Šyša polder regulation is Standards of required operating water level horizons near pumping stations in summer polders of Šilutė district, approved by Director of Šilutė district municipal administration in 2010 and based on the agronomical norms that were applied during Soviet times. Company that operates polder hydro-engineering equipment can begin water pumping in spring only after the flood ends and when the water subsides to the surface of the ground, thus natural flow ends and double-leaf gates close. From April 1st until May 30th it is not allowed to reduce the amount of water in ditches because water pumping causes lifting of silt and development of vegetation which reduces the amount of oxygen in the water of polder ditches (fish begin to suffocate, conditions to spawn become unfavorable). However, not in all cases this procedure is advantageous to farmers and meadow birds as well. It is important to combine interests of farmers and nature protection specialists when regulating the water level in the polder by taking into account the characteristics of the polder (inertness, micro relief, etc.). Since 2014 by the initiative of Baltic Environmental Forum Lithuania, water from Šyša polder is pumped according to the recommendations of experts: in the spring until the first decade of May the water is kept at the soil surface level and later – water level is regulated according to the above mentioned regulation. This way you can combine interests of both, birds and farmers. By the way, it is recommended for farmers to organize themselves into cooperatives and together with environmentalists deal with water regulatory issues and at least partially finance water pumping works.

TO ENSURE OPTIMAL WATER LEVEL IN POLDERS IT IS RECOMMENDED TO:

- *clearly identify use priorities of each polder, according to the needs of farmer, bird and fish protection;*
- *properly manage polders: regularly remove silt and aquatic plants from the ditches and ensure the watercourse from isolated areas (deeper places where water is stagnate);*
- *constantly monitor the water level trends in polder during beginning of vegetation (May – beginning of June), i.e., carry out the water level measurements at pumping stations and polder area in specially equipped ground water level measurement wells at least 3 times a week. Adjust pumping stations according to the data of ground water level measurements.*

Photo: Staffan Widstrand

MOWING

A lot of valuable information about the management of meadows is provided by prof. P. Kurlavičius (2008, 2010). Heavy use of habitats suitable for Aquatic warbler (e.g., haymaking in June) and their loss is the main reason of Aquatic warbler and other grassland-nesting birds' population decline. Mowing time and used technologies are very important in terms of biodiversity protection.

Mowing terms. Many passerine birds, including Aquatic warbler, are adapted to frequent deaths of birds during breeding, migration and wintering periods by having few broods per year. Perhaps it would be possible to come to terms with the fact that Aquatic warblers fail to breed a second hatch if the species would not be threatened with extinction. In this case, mowing from mid-July could be a compromise between

Photo: Petras Lengvinas

Aquatic warbler feeds juveniles

Photo: Žymantas Morkvėnas

farming and bird protection needs. Knowing that survival of the Aquatic warbler in Europe is a real threat, and in Lithuania the following bird population is on decline, it is very important to provide Aquatic warbler with the opportunity to breed a second hatch.

Nature conservationists have identified that most grassland birds have their first brood by the 1st of July. In regular grasslands, the mowing could be started from this date. Corn crakes breed much longer. In the areas, where the species is protected, it is recommended to start mowing not earlier than the 15th of July . The beginning of mowing is even more postponed at Aquatic warbler breeding sites. Due to the high risk of total extinction, it is necessary to save every chick. Therefore, in order to allow the bird to have both broods, it is recommended to postpone mowing until the 15th of August.

However, all these terms are relative and every year they can change depending on weather conditions and moisture. Mowing time most favourable for birds can be selected after consultation with the specialists of protected areas administration.

The areas, where Aquatic warblers breed annually are identified by nature conservationists who carry out population estimations. They prepare maps for each area, which show recommended mowing times; therefore, a farmer doesn‘t need to be concerned. Farmers receive information about the mowing terms in their municipalities each year until the 15th of June.

If it is not possible to comply with the recommended mowing schedule then it is required to leave at least half of the area unmowed. Such mowing method is also recognized as environmentally friendly. If haymaking begins no earlier than July 1st then it is possible to claim the compensation payments. It is recommended to mow in strips, leaving 20 m wide mowed and unmowed grass strips. Roused animals can hide in these strips, and the unmowed grass – mature and spread seeds. It is a pity that only few farmers decide to apply such effective compromise for the protection of the birds.

Polders which have been recognized as the Aquatic warbler protection areas are required to be mowed annually. However, mowing intensity of the seacoast flooded meadows, such as Žuvintas mires, depends on the structure and type of the vegetation. Annual mowing of small sedges (1 m in height) can cause irreparable damage to the vegetation. In such sedge communities it is recommended to mow only 1/3 or 1/4 part of the territory annually (different part every year) while mowing specific areas in strips.

Mowed grass can be used for production of litter or biofuel (hay pellets) when farming in Aquatic warbler friendly mode (mowing after August 15th).

Dried grass preparation for biofuel production in Žuvintas Biosphere Reserve

Photo: Regimantas Vabuolas

Photo: Jūratė Sendžikaitė

Favorite grasslands of Aquatic warbler – Two-ranked sedge meadows (A), also these birds can be found in Reed canary-grass (B) and Meadow foxtail communities (C).

A

B

Photo: Jūratė Sendžikaitė

Intensive reed mowing during vegetation period disrupts the growth of reeds in Tyrai: high reeds dominate in reed communities which were unmowed for many years (June 2012, A); the same reeds after 2 years of intensive mowing (June 2014, B)

Mowing is necessary for the maintenance of grassland ecosystem. Unmowed meadows are abandoned by the birds because throughout the years, accumulated stiff dead plant mass coats the surface and is impermeable to light, also fallen seeds usually do not reach the ground. Such conditions are unfavorable for reproduction of insects and other invertebrates resulting in a deteriorating nutritional base, hence birds leave the unmowed meadows.

Few year ago situation like this could be observed in the abandoned Tulkiaragė polder (Šilutė district) and Tyrai seacoast meadows and fen mires (Klaipėda district) where dense reed overgrowth had formed. In the past, Tyrai were home for cattle but a couple of decades ago economic situation has changed, and the number of large livestock keepers has decreased. Area was not particularly attractive for mowing because the groundwater was too close to the ground surface (0–30 cm depth) during the vegetation period and interfered with haymaking. These areas require special machinery that can operate in wet lands; however, in order to acquire such machinery, additional investments are necessary. In the long run, unmanaged area had been overgrown with dense reed communities, and open grassland birds (Aquatic warbler, Great snipe, Spotted crake, Corncrake, etc.) began to lack suitable breeding areas. Restoration of previously prevailing wet meadow habitats in Tyrai requires intensive mowing of reed communities for at least five years. In 2012 mowing of these forgotten reed communities has begun. In just over three years of intensive mowing (2 times during the vegetation season) growth of reeds was significantly disrupted: they became significantly lower, reed communities became sparse and the old grass layer which was suppressed grassland renewal became much thinner and less dense.

Managed monotonous Tulkiaragė polder reed communities (A) become a species-rich flooded grassland habitats (B)

Photo: Jūratė Sendžikaitė

Žuvintas Biosphere Reserve Directorate (A) and Kretinga Forest Enterprise (B) acquired dual-wheel tractors which are used in management of Aquatic warbler habitats

A

Photo: Jūratė Sendžikaitė

B

Photo: Žymantas Morkvėnas

Tulkiaragė polder is located in the picturesque shore of Krokų Lanka Lake. Abandoned for many years meadows eventually overgrown by reeds. These reed beds there were started to mow only in 2012. It is expected that the restored open meadow habitats will once again tempt Aquatic warbler females to build nests in Tulkiaragė.

Mowing machinery. Farming and biodiversity protection success depends on the technical suitability for specific habitats, when mowing in wet flooded meadows and mires.

High ground water level means that heavy machinery with low tire adhesion gets stuck while working, forms deep tracks, disrupts turf and damages vegetation. Compressed soil, shattered soil structure, changes in aeration (supply of oxygen) conditions and increased water erosion results in adverse grassland structure changes: grass thins out, fertility declines, and often undesirable plant species settles in disrupted turf areas (e.g., Bulrush, Reed, Yellow iris, Bogbean, etc.). Use of specific equipment is not necessary for the farmers who work in the areas where the ground water level during mowing is at least 20–30 cm below the soil surface.

Soil compression and mutilation of vegetation cover in wet habitats can be reduced through these agricultural equipment chassis improvements: dual wheels, multi-axis mobile machines, improved tires (e.g., special tire treads), adjusted tire pressure, tracked chassis (Kirka,

Since 2012, management of the flooded seacoast meadows and fen mires in Tyrai (Lūžija Landscape Reserve, Klaipėda district) is being performed by Kretinga Forest Enterprise. Abandoned and only fragmentedly managed territory (the vast area has been mowed only in 2006 for environmental purposes, but mowed grass was left in the fields) was dominated by the dense and tall reed communities with fragments of sedge fens. Thanks to the financial assistance of LIFE+ Project, Kretinga Forest Enterprise has acquired tractor with dual-wheel system, front and rear mowers (with the total working width of 6 meters), rake (with the working width of 6 meters) hay baler with variable chamber, roller rake and trailer for the management of Tyrai meadows.

Wheeled tractor advantages compared with the wide tracked tractors (Tyrai case):

- *Universal application;*
- *Can independently cross relatively large distances from the technical base to the managed area (no need for the additional transportation equipment to transport wide tracked tractors);*
- *Consumes less fuel;*
- *Lower price. Savings can be used to buy extra technical equipment, necessary for mowing.*

In the most parts of Tyrai meadows, ground water during vegetation period is near the surface. In order to reduce the heavy pressure from the tractor to the surface it was decided to use the double rear wheels (double front wheels failed because of increased load to the steering column so it was decided not to use them). This allows:

- *To reduce the pressure on the surface and thereby protect tractor from getting stuck in wet places and old, overgrown drying ditches;*
- *Simultaneous use of two mowers (front and back), i.e. 6 m wide belt of reeds mowed in one pass. This option saves fuel because less driving is required in the territory;*
- *Increased driving stability (important for mowing in the meadows of uneven terrain).*

Enterprise had to redo the chassis of trailer with bale loading crane and hay baler because the wheels had low contact with the wet soil surface and were getting stuck, disrupted turf and damaged vegetation.

It is possible to explore these solutions by exploiting the advantages of wheeled tractor in Tyrai fen mire because of sufficiently solid soil. In Aquatic warbler key areas, where mineral soil is found below and the peat layer is higher, this technology is not effective and, therefore, the tracked tractors should be used.

Photo: Žymantas Morkvėnas

2010). The main purpose of dual wheels is to increase traction with the ground area which reduces pressure on the soil and thus increases pull force of the tractor. If the air pressure in dual wheel tires are correctly adjusted, total weight is distributed to a larger area, thus avoiding deep ruts and soil compression. This is particularly important when working in wetlands. If farmers do not have access to the dual wheels, then it is possible to work with reduced air pressure in tires.

In the territories, occupying large spaces, where the groundwater is on the soil surface level or even higher, foreign countries use tractors which instead of conventional wheels are equipped with rubber track systems. This innovation also reduces the soil pressure. Note: these track systems are manufactured for the specific models and are quite expensive. Largest selection is for the Western tractors models like: "New Holland", "Valtra", "John Dere", "Kubota", and "Massey Ferrguson".

Often, lighter tractor can help to avoid many troubles, and installation of the additional mower can reduce the driving intensity. Problem:

A tractor with rubber track systems

Photo: Tractordata.com

Photo: Jūratė Sendžikaitė

Wide track tractor successfully working in Aquatic warbler territories in Poland

additional mowers increase the weight of the tractor, which may be unacceptable in wetter places.

It is also important to note that an additional mower can be mounted on a tractor with a front and rear output shaft. Normally, such technical modification is applied to more powerful (heavier) tractors. Light tractors simply are not powerful enough to operate two mowers.

Specialized wide track equipment is handy in very wet areas. Specialists say that this technique pushes the ground with only about 50 g/cm^2 power which is less than the human foot pressing the ground. Transportation of such machinery requires a special permit because its width usually exceeds the maximum transportation width (2.55 m). It is very expensive equipment and only worth buying for large-scale farmers or farmers' cooperatives which have a long-term perspective and managed wet meadows occupies territory of more than one hundred hectares.

In wet territories probably the most problematic are auxiliary technical tools – grass baling equipment and trailers which are necessary to remove the grass from the fields. In most cases the chassis and wheels are not suitable for wet soil, so in order to work effectively, the chassis must be redesigned.

Other commonly used technical alternative in wet meadows and mires is a mower "Briel- maier" (Germany). Thorny drums perfectly adheres to the surface, aerates the turf and allows to work safely even on steep slopes (suitable for the reclamation ditch maintenance) which previously has been only possible to mow manually. "Brielmaier" mower cuts the grass just like scissors (Bidux cutting system). Machine has working width of 1.25 to 6.00 m, mowing speed – 3–10 km/h, remote control – up to 250 m and crushed vegetation diameter is up to 50 millimeters. "Brielmaier" mower does no harm to the turf and is more friendly

In wet meadows and fen mires there is a possibility to use mower "Brielmaier " instead of conventional machinery.

Photo: Žymantas Morkvėnas

Photo: Jūratė Sendžikaitė

Grass that was cut, but left in a meadow not only inhibits the atoll growth, but also allows the further formation of more tick and more dense layer of dead grass.

to the environment (i.e. animals suffer less) than the conventional disc mower. Therefore, it is usable in divergent meadows with valuable biodiversity and protected species. In addition, you can use a hammer knife or spiral flail mower, rakes, hay flipping or hay shoving tools. The grass mowing machine can be operated remotely.

Forage manufacturing technologies.

Herbaceous forage production technologies have a significant impact on biodiversity. It is favorable for the biodiversity when the grass is dried in the meadow because most of the invertebrates living on the grass are killed (mechanically crushed) when the fresh grass is crushed and directed to the transport vehicle. On the other hand, drying grass on the ground often incurs substantial losses due to the bad weather conditions, in addition, this hay production method requires more intensive labor than use of the grass silage or dried grass compression technologies.

Haylage, chops and silage production are less environmentally friendly technologies. Thanks to these technologies, grasslands can be used very intensively by mowing the grass several times during the season, however just in a few years insect fauna shrinks (Kurlavičius, 2008, 2010). Silage production is slightly more favorable – some part of insects can escape while the grass dries.

To leave the mowed grass is uneconomic and unfavorable for biodiversity because last year's accumulation of the dense grass cover on the soil surface results in changes in light intensity, microclimate, soil and other characteristics. This prevents the growth of plants in the spring and seed germination. Therefore, mowed biomass must be removed from the territory. Rules of farming payments state that it should be done until the 30th of October and in wetlands –until the 1st of March of the next year. In exceptional cases, where due to the natural conditions it is not possible to collect the mowed biomass, it is advised not to mow at all. Biomass shredding will not create any positive effect, instead, it will destroy the part of biodiversity and the biomass will be left to rot in the area. Shredding can be only justified when the territory needs to be prepared for farming with agricultural machinery. Shredding improves biomass rotting process, smoothes the humps and helps to remove the bushes.

It is particularly difficult to combine the protection of birds and interests of farmers who seek to prepare good quality forage in Aquatic warbler habitats. It is crucial for the bird protection to start mowing as late as possible so the brood would have time to grow up. On the other hand – valuable forage can be prepared only from the young grass, mowed in the beginning of grain crop ripening (usually end of May – beginning of June).

Possible solutions: 1) to prepare forage in other, less valuable in terms of the biodiversity, territories or purchase it from farmers who don't keep cattle and only produce forage, to mow the Aquatic warbler habitats only when the birds have bred two hatches (grass suitable for litter or biofuel); 2) to mow only in the part of the Aquatic warbler territory and leave the unmowed grass strips for the birds to breed in; 3) to involve specialists (e.g., specialists of Protected Areas Directorate) who would locate the specific breeding areas of the rare birds and provide information in which places it is possible to mow without the fear of destroying nests with broods.

Mowing principles. Aquatic warbler protection in the important areas should follow the same rules as any other area where the meadow fauna may suffer from mowing. It is recommended to mow in one direction or from the center to the edges. However, such haymaking requires special mowers. By the way, this type of mowing is unsuitable in the small polder plots, circumscribed by ditches. It is much more efficient to use a special mower fitted with scarer. The simplest scarer can be made by welding metal rods into the frame which should be fitted against the mowing equipment. The frame has attached, soil surface reaching chains (40–50 cm) that are quite effective in scaring birds and other animals. When mowing grass with circular mowers, it is advised to raise them 10–15 cm above the soil surface.

REMOVAL OF BUSHES AND REEDS

Aquatic warblers avoid habitats which are overgrown with dense bushes or high reeds. Annually mowed areas are not threatened to be overgrown with bushes or reeds. Therefore, removal of bushes or reed cutting is only relevant for the unmanaged ditch slopes and meadows which are abandoned for many years.

Bush cutting. Hand bush cutters of various powers are usually used for bush cutting. Special flail mowers with automated crushers can easily cut and crush up to 5 cm or even thicker growths but they are cost-ineffective in small bush-covered areas, hence not popular in Lithuania. It is ideal to remove the bushes when the ground is frozen (in the late fall, winter or early spring). It is important to assess whether you will have time to enter the field and collect the cut bushes. Also it is important to cut the bushes in less than 5 centimetres to the ground surface. This will ensure that fewer of them will grow back growth and they will be easier to cut and shred because machinery will not get stuck on stumps.

Reed cutting. Reeds are usually mowed in the summer for the nature conservation purposes. In order to inhibit reedbeds in abandoned wet meadows and sedge fens, it is necessary to mow them at least twice during the vegetation season. Mowed reed biomass must be collected and removed from the managed territory. Reed vitality is mostly reduced by mowing them in the beginning of flowering (June). However, the first mowing should be delayed at least a couple of weeks (until July 1st) to give time for reed birds for nesting and brood growing. Therefore, reed mowing in the beginning of July is kind of a compromise – destroying the reeds but also protecting bird nests and broods. Mowing reeds in the beginning of flowering interrupts their normal life strategy, i.e. to accumulate more nutrients and energy in the rhizomes during summer which will be very important at the beginning of the next growing season. Mowed reeds and biomass loses a lot of energy and growth-promoting substances which doesn't reach the rhizomes. For the formation of stems and foliage in aftermath reeds begin to use nutrients which were already accumulated in the rhizomes. The second mowing should begin when the re-grown reed reaches 2/3 of its normal height. Of course, mowed reeds re-sprout but once again by wasting the materials accumulated in the rhizomes for the winter time. This way each reed mowing prevents them from properly preparing for the new growing season, and next spring they will grow back weaker, i.e., will be considerably lower and less dense. Mowing effect can already be seen in the first year but the result of habitat restoration will require a minimum of five years of consistent work. It is important to know that reed mowing in winter (e.g., production of biofuel, roofing) has no effect on the reed condition or impacts it only slightly. So in the territories with dense reeds it will be impossible to restore the desired habitats. However, reeds eventually may nevertheless start to deteriorate and become unsuitable as roofing material if habitats with fewer nutrients are to be mowed for several years in a row.

Combine harvesters „Seiga-3“, „Loglogic Softrak“ and others, which are adapted to the work in swamps and shallow water, can be used for reed mowing. „Seiga-3“ may float on the water as the harvester weighs less than 2 tones and each of the 6 tires has capacity of 1 m3 of air. Since the combine harvester has very wide wheels with the low-pressure tires, its effects on turf and soil are minimal. A man walking through the same wetland leaves much deeper footprint than the harvester.

Grazing. Grazing in the important Aquatic warbler protection areas, unlike with other grassland birds, is not favorable. However, cattle‘ grazing in aftermath is no longer dangerous for the nests and brood of the Aquatic warbler. The most favorable alternative for these birds – search for other appropriate grazing areas in early summer. If this is not possible, then the cattle density should be regulated in the area, i.e. only one animal can graze in two hectares of land. These meadows are most suitable for the beef cattle because they are more accustomed to a lower quality grass than the dairy cattle.

Shrub removal in areas important for Aquatic warbler

Photo: Žymantas Morkvėnas

Memo regarding farming in the designated Aquatic warbler protection areas:

- *Prohibited to plow the meadows and pastures or to re-sow them with cultural herbs;*
- *Prohibited to use fertilizers and pesticides or lime the agricultural land;*
- *Prohibited to dry or otherwise alter the hydrological regime of the territory;*

If mowing and grazing terms in a particular area are not regulated by the special land and forestry exploitation rules, protected areas regulations, environmental regulations, protection regulations, planning documents of protected areas, protection agreements with private landowners and public land managers or by other documents, then it is recommended to start mowing in the designated Aquatic warbler protection areas from August 15th. In the areas where Aquatic warbler is not observed (mainly dominated by Reed canary-grass and Meadow foxtail-grass communities) the mowing could start from the July 1st. But in this case it is recommended to mow only a half of that territory and mowing itself should not last longer than until the end of July. Mowed grass (hay, green mass, etc.) in the meadows and pastures should be put in order (pressed, transported from the field, hay placed into cones) before October 30th or in the exceptional cases due to too high ground water table: until March 1st.

Extensive grazing (grazing density below 1 LSU/ha) is recommended only in the aftermath, keeping animals fenced in.

Compliance to these recommendations could let to secure relevant environment protection in the areas designated for Aquatic warbler conservation purposes.

Information about agri-environment requirements coming from Lithuania's Rural Development Programme for 2014-2020 is presented in the next chapter.

Photo: Žymantas Morkvėnas

Photo: Žymantas Morkvėnas

STATE SUPPORT FOR THE ENVIRONMENTALLY FRIENDLY FARMING IN WETLANDS. POSSIBLE ECONOMIC OPETATIONAL MODELS

ECONOMIC ASPECTS OF FARMING IN AQUATIC WARBLER FAVORABLE MODE

For people who are farming in territories rich in natural diversity, it is recommended to choose the environmentally friendly farming techniques. For this purpose there is a range of support mechanisms. Since 1992 EU funds have been allocated to support the environmentally friendly farmers. 80% of the contribution comes from the Agricultural Fund of European Union, the rest – from the government budget of Lithuania. Agricultural support in Lithuania is conducted through Lithuanian Rural Development Programme for the period of 2014–2020.

Rural Development Programme (RDP) is intended for the implementation of the National Rural Development Strategy. The main objectives of 2014–2020 RDP strategy are:

- *Agricultural competitiveness;*
- *Sustainable use of natural resources;*
- *Balanced territorial development.*

Support is given according to the Lithuanian 2014–2020 Rural Development Programme package, which is prepared for the implementation of these objectives.

Strategic direction 2 is relevant for the strengthening of sustainable farming: *Sustainable use of natural resources; caring for the environment, rural areas; and readiness of agricultural sector to address the challenges of climate change and to maintain the production capacity of the farmed lands.* Payments based on this strategic direction: I) for the farming restoration in the semi-natural habitats of poor state with a prerequisite for survival – friendly farming; II) farming that preserves the landscape and species diversity.

Investments in tangible assets and Agri-environment-climate measures are intended for protection of the Aquatic warbler.

For the protection of those rare songbirds there is an activity called „Preservation of aquatic warbler habitats" under the measure called *"Investments in tangible assets".* This measure aims to restore currently abandoned potential breeding sites of Aquatic warblers. If the measure is implemented, one-time support is given to clean up abandoned fields. Activities supported are as follows:

- *Bush cutting;*
- *Mowing and removal of reeds;*
- *Removal of old grass, cut bushes and reeds.*

Participation in this measure is only possible in specific territories (indicated on the website www.meldine.lt). Application should be prepared according to the invitation of National Paying Agency. When applying, it is necessary to provide an outlay of the restoration works which is then approved by the specialists of relevant Municipality. For the applicants 100% of the total eligible costs are financed. The maximum amount of support per applicant may be up to 85 000 EUR. After successful measure implementation the farmer undertakes the responsibility to participate in the activities, designed for the Aquatic warbler habitat maintenance under the measure called "Agri-environment and climate".

In the measure "Agri-environment and climate" there are two activities dedicated for the protection of aquatic warblers, based on the type of the territory (grassland or wetland).

Preservation of endangered aquatic warbler habitats in natural and semi-natural grasslands. These rather complicated requirements of this measure are adapted to the needs of the protection of the rare birds in fertile flooded meadows (mainly, in the polders). Here the mowing regime becomes clear only after June 15th, when areas are announced where aquatic warbler males are detected (there is a high probability that females are breeding nearby). This information is announced in places, where applications are received (physical location or informational online system). If there are no aquatic warblers found in the declared territory, farmers may start mowing half of the territory from July 1st and finish until July 30th. If singing males are detected in the area, farmers must start mowing half of the territory from August 15th, according to indicated aquatic warbler breeding sites. In every case, other part of the declared territory should be mowed after August 1st and all biomass collected and removed from the area till October 1st. In exceptional cases (when it is very wet) biomass can be stacked and removed from the field before March 1st of the following year. Biomass removal is necessary, because it eliminates the amount of nutrients' excess, the accumulation of which will eventually change the structure of the habitat and make the area no longer suitable for this bird. When the territory is managed in this way, the necessary preconditions are set for aquatic warblers to have two broods of juveniles successfully and to have those birds nesting there in the future. The farmers participating in this measure can graze animals only in mowed areas (atolls) with the intensity of up to 1 cattle per ha.

Payment of the measure - 291 Eur/ha. Additionally, farmers recieve basic direct payment and greening payment; and can recieve payments that are related to Natura 2000 territories and territories under zones with natural or other specific obstacles.

Aquatic warbler breding sites identified in the information system of application reception

Preservation of endangered aquatic warbler habitats in wetlands. This measure is applied to maintain good quality aquatic warbler habitats in its typical low productivity fen mire habitats. Farmers who declare their land for this measure should mow the whole area once per two years and half of the area every year. It is necessary to start mowing from August 1st. The biomass should be taken care of until October 1st and removed until March 1st of the following year. By mowing in this regime, the optimal conditions for aquatic warblers to provide food for juveniles and find place for a nest are ensured. In this way, the impact of driving machinery for the sensitive fen mire ecosystem is lowered. It is allowed to graze cattle with the intensity of up to 1 catle per ha.

Payment of the measure - 160 Eur/ha. Additionally, farmers recieve basic direct payment and greening payment; and can recieve payments that are related to Natura 2000 territories and territories under zones with natural or other specific obstacles.

In aquatic warbler habitats farmers can also declare their land for other activities of the measure "Agri-environment and climate". Below you can find their descriptions with evaluation of favorable conditions for aquatic warbler.

Extensive management of grassland for animals grazing. According to this measure, cattle should be grazed during May-October in a low intensity (0,3–1,0 cattle per ha) while the rest of the grass is mowed and removed from fields till October 30th. This measure is not favorable for aquatic warbler but it is better compared to common intensive farming. Despite that, the measure is in general favorable for rare birds that live in agricultural landscape and for the maintenance of ecologically valuable habitats

Payment of the measure - 101 Eur/ha. Additionally, farmers recieve basic direct payment and greening payment; and can recieve payments that are related to Natura 2000 territories and and territories under zones with natural or other specific obstacles.

Management of specific grasslands. Farmers that applied for this measure are obliged to start mowing not earlier than July 15th . They must also remove biomass from the fields until October 15th. Farmers are allowed to gaze cattle with the intensity up to 1 cattle per ha. Territories which are not grazed must be mowed and biomass must be removed from the fields (it is forbidden to shred the grass in the fields). If aquatic warblers breed in the field declared for this measure, the birds have a chance to have the first brood sucessfully, but if the fields are mowed on July 15th, then the second brood may be destroyed. Nevertheless, the measure does not require to start mowing imediatelly. If the weather is favorable, mowing can be postponed at least in the areas where aquatic warbler breeds. Farmers are recommended to contact and consult aquatic warbler concervation specialists via www.meldine.lt/en or approach specialists of the nearest protected area direction. If the recommendations of nature conservationists are followed, then this measure can be very favorable for aquatic warbler.

Payment of the measure - 69 Eur/ha. Additionally, farmers recieve basic direct payment and greening payment; and can recieve payments that are related to Natura 2000 territories and territories under zones with natural or other specific obstacles. The payment of this measure is smaller comparing to other measures but it is much more flexible and can be adjusted to aquatic warbler conservation or farmer's needs to prepare the fodder.

Extensive management of wetlands. It is possible to declare the land for this measure only in the territories specified by the Ministry of Environment. Those areas are announced in places where applications are received (physical location or informational system – there is a separate layer of wetlands). Farming according to the measure is rather complicated. In most cases it is necessary to have special machinery that is designed for wetland management. It also gets complicated when one needs to dry the mowed biomass. the applicant is obliged to mow all declared areas starting not earlier than July 15th . Mowed biomass must be stacked until October 15th, and removed from the fields until March 1st of the following year. It is allowed to graze cattle with the intensity of up to 1 cattle per ha. This measure is not directly connected to the protection of aquatic warbler. If the mowing in the fields starts on July, the second brood of juveniles will not sur-

The layer of wetlands in the information system of application reception

vive. If the mowing is performed in good quality low productuvity fenmire habitats every year, undesirable effects on soil can occur in this specific territories due to the intensive use of equipment. Nevertheless, in the aquatic warbler habitats, which are overgrown by reeds, this measure is perfect for restoration of homes of these rare birds. When the reed beds are mowed every year, they become weaker and decrease in the long run. In this way, conditions are made for sedge prominence and quality of aquatic warbler breeding sites is increased.

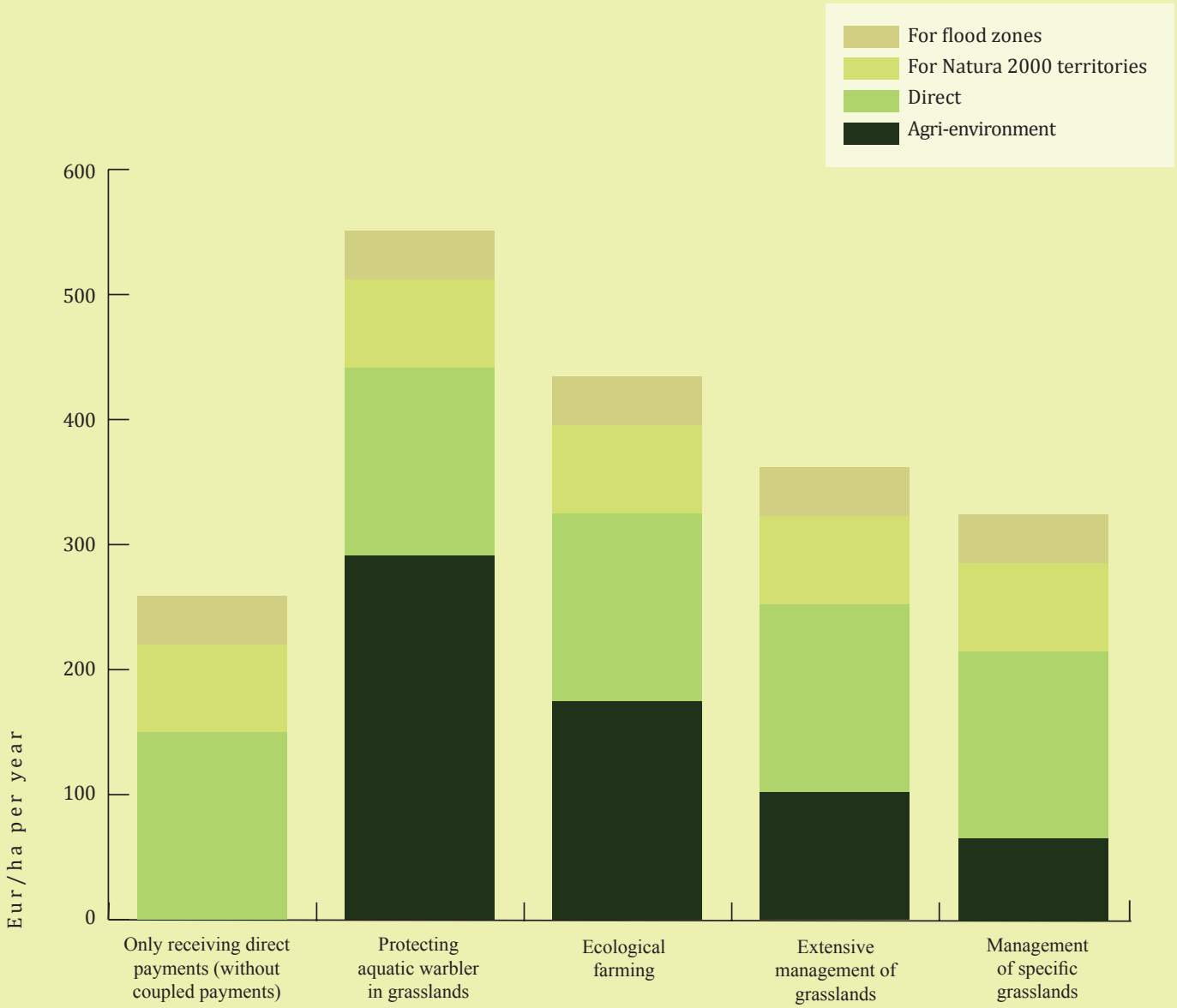
Payment of the measure - 208 Eur/ha. Additionally, farmers recieve basic direct payment and greening payment; and can recieve payments that are related to Natura 2000 territories and territories under zones with natural or other specific obstacles.

MEASURES OF THE RURAL DEVELOPMENT PROGRAMME AND THE POTENTIAL PAYMENTS FOR PERIOD OF 2015–2020 M.

Table 1

SUPPORT MEASURES	PAYMENTS SIZE (Eur/ha per year)
Basic direct payments	63
Greening paymentt	49
Payment for the first hectares (up to 30 ha)	55
Payment for the young farmers (up to 90 ha)	46
(and in addition to all above, with them coupled payments for dairy cows; for beef cattle and meat sheep, dairy bulls and dairy goats)	
AGRI-ENVIRONMENT AND CLIMATE MEASURE	
Extensive meadow management by cattle grazing	101
Habitat preservation of the endangered Aquatic warbler population in the natural and semi-natural meadows	291
Extensive wetland management	208
Habitat preservation of endangered Aquatic warbler population in wetlands	160
ECOLOGICAL FARMING MEASURE	
Perennial grasses during transition to ecological farming	182
Perennial grasses during ecological farming	176
NATURA 2000 AND THE WATER FRAMEWORK DIRECTIVE RELATED MEASURES	70
PAYMENT FOR THE LESS FAVORABLE AREAS: MEASURE APPLIED IN FLOOD ZONES	55,20 (less favorable areas in a small extent) 73,60 (less favorable areas in a high extent) 48,80 (flood zones)
INVESTMENTS IN TANGIBLE ASSETS MEASURE	According to the drawn up and agreed estimates (up to 85 000 EUR per applicant)

THE TOTAL AMOUNT OF PAYMENTS WHEN SELECTING DIFFERENT AGRI-ENVIRONMENTAL MEASURES



Agri-environment measures set more convenient dates for mowing start, comparing to what is recommended for Aquatic warbler protection: to delay mowing until mid-August or at least until July 15th. Such requirement is disadvantageous for the farmers who are preparing forage. However, the most suitable grasslands for the Aquatic warbler (sedge communities, mixed sedge communities with Reed canary-grass) are not particularly valuable in an economic sense because: I) mainly mowing starts in the second half of June or even July due to the high water level; II) the majority of sedge plant forage is shoddy due to small amount of digestible protein, sugar, minerals, also nutrients are relatively poorly digested and the silicon salt in leaves irritates the lining of the gastrointestinal tract of animals.

Farmer would experience losses if he would start mowing the productive and attractive, in terms of cattle, Reed canary-grass and Meadow foxtail-grass communities only from mid-August. These meadows are located all over the Nemunas Delta polders. Forage prepared in late summer is of poor quality, i.e., it would lose a lot of valuable nutrients (protein, sugar, starch, etc.) and accumulated large amounts of fiber (the more fiber the worse digestibility of the forage). Payment according to the Aquatic warbler protection measure in the natural and semi-natural grasslands compensates the losses.

Table 2 shows the maximum potential losses for those involved in cattle breeding, but not breeding in Aquatic warbler friendly manner (i.e. mowing from August 15th). Calculations are made based on assumptions that: I) the dry mass preparation (cutting, rolling, raking, pressing and transport) costs can vary from 38 to 88 EUR / ha; II) silage preparation (cutting, rolling, raking, pressing and transport) costs can vary from 94 to 153 EUR / ha.

Note: Costs could be higher than indicated if these services are purchased.

Grassland productivity data provided in table 3 was used to perform calculations. Both, the dry mass and silage preparation costs are determined by machinery used, amount of biomass, environmental conditions, mowing time and many other factors.

Photo: Žymantas Morkvėnas

LOSSES INCURRED BY FARMING ACCORDING TO THE AQUATIC WARBLER PRESERVATION MEASURES (EUR/HA)

in comparison with yield of the conventional farming methods in the different natural and semi-natural meadows (Šyša polder example)

Table 2

With cattle			Without cattle		
Productive meadows	Medium productivity meadows	Low productivity meadows	Productive meadows	Medium productivity meadows	Low productivity meadows
222–270 Eur/ha	108–151 Eur/ha	31–69 Eur/ha	54–103 Eur/ha	13–41 Eur/ha	6 Eur/ha

NATURAL AND SEMI-NATURAL MEADOW BIOMASS PRODUCTION (T/HA) YIELD (Šyša polder example)

Table 3

	Production	Productive meadows (t/ha)	Medium productivity meadows (t/ha)	Low productivity meadows (t/ha)
I mowing	Green mass	6,0	4,8	3,6
	Haylage	4,2	3,4	2,5
	Hay	2,4	1,9	1,4
II mowing	Green mass	4,0	3,2	2,4
	Haylage	2,8	2,2	1,7
	Hay	1,6	1,3	1,0
Total:	Green mass	10,0	8,0	6,0
	Haylage	7,0	5,6	4,2
	Hay	4,0	3,2	2,4

Photo: Jūratė Sendžikaitė

The greatest losses would be for the cattle farmers who are farming in fertile flooded meadows which are crucial for the Aquatic warbler protection. Grazing limitations would cause losses as the biomass remains unused. This would require additional funding for the grass mowing and acquisition of forage for cattle. However, those who participate in the Aquatic warbler protection measure can get 291 EUR/ha in addition to the basic payment for the territory (112-216 EUR/ha), payments for Natura 2000 (70 EUR) and less favorable areas, Therefore, even cattle farmers who maintain the Aquatic warbler protection requirements and have the ability to move cattle to other fields should suffer no losses.

For farmers who don't keep any cattle they should always compensate financial losses due to payments because the Aquatic warbler protection measure allows grassland mowing only once during the vegetation season, when under normal conditions farmers who don't keep cattle would have to mow at least twice per year. This way, costs of meadow mowing are lower. Landowners should be interested in managing the meadows themselves or renting them with a contract that obligates the tenant to comply with the requirement of this particular agri-environmental measures and climate requirements. This measure is particularly attractive to the farmers with their own agricultural machinery. Even if the cost of preparing the dry biomass would equivalent to 80 EUR/ha, the owner would still have 211 EUR/ha thanks to the payments. In case of service leases it should be determined that 1 hectare management rate would not exceed the amount of the payment. Dry biomass rolls can be sold to the biofuel manufacturers or given away to the farms that lack hay litter.

Photo: Žymantas Morkvėnas

In summary it can be said that taking care of the Aquatic warbler habitat maintenance is most beneficial for the third group of farmers, while the first group of farmers would receive minimal benefit. In areas suitable for the Aquatic warbler, which occupy more than 20 hectares and are dominated by Meadow foxtail-grass or Reed canary-grass communities, it is advisable to keep the beef cattle (not exceeding the allowed grazing area density).

Payments under the Rural Development Programme measure „Endangered bird Aquatic warbler habitat preservation in the natural and semi-natural meadows" ensures that farmers who have chosen this measure would not suffer losses. Permission to mow from July 1st in areas where the Aquatic warblers weren't observed creates good conditions for farmers to ensure the timely supply of forage and protection of the Aquatic warbler habitats.

WHERE TO USE BIOMASS OF THE LATE MOWING GRASS?

Late mowing costs can be cut by selling the dried grass biomass to the litter and (or) fuel pellet manufacturers and boiler houses which are stoked by pressed straw or pressed hay biomass. Although, regarding cost it should be more economically viable to produce the litter pellets but their technological requirements are significantly higher than for the fuel pellets.

Biomass used in production of the fuel or fuel pellets doesn't have to meet very high standards – grass can be cut at any time of the year and be left in the field for up to six months. Such biomass is preferred by the biofuel manufacturers because:

- *It is easier to recycle;*
- *It is characterized by the higher net calorific value;*
- *Biofuel made from it has less tar so it is better suited for boilers.*

The most important condition for the production of fuel pellets from grass biomass – maximum moisture content of the dried mass should not exceed 14–15%.

Currently, the total grass biomass demand by the three pellet production lines operating in Šilutė district and Juknaičiai boiler house is more than 20 thousand tons per year. For comparison – up to 1.5 thousand tons of dry biomass can be prepared in the Šyša polder area annually. However, the experience of 2013–2014 showed that despite the capacity of all pellet producers, demand for grass biomass by biofuel manufacturers in Šilutė area was low – granular oversupply was evident. However, if more and more boiler houses were adapted to biofuel, grass biomass demand is expected to grow in the future. In 2015 „UAB SWECO Lietuva" conducted expert study (ordered by Baltic Environmental forum Lithuania), which revealed that in Šilutė district viable grass pellet boiler rooms could be installed in Rusnė, Kintai and Švėkšna boiler houses. Their needs should be met by the calculated grassland area from 213 to 355 hectares depending on grassland yields (3–5 t/ha). Given the fact that the Šyša polder is larger than 700 ha, it appears that even in such case the existing grassland biomass as biofuel potential will not be fully exploited. Therefore, there is a possibility to use pallets to an even greater extent.

Although, at the moment the grass pellet production realization still is slow, but the situation should change in the future. Therefore, it could be beneficial to install a pellet production line even for large areas (from 200 ha) where are no biofuel production lines within 50 km radius. Practice shows that the optimal efficiency of such equipment is 0.5–2 t/h. For maximum productivity it is necessary to have about 400 hectares of the mowed meadows Both, maintenance costs and power consumption of such equipment operation are quite similar. However, higher performance machinery requires much larger areas to prepare the biomass. Required land area size depends on the grassland pro-

ductivity. For example, wetlands overgrown with reeds can supply 15–20 t/ha of wet mass (5–8 t/ha of dry mass). Barren seacoast meadows and mires which are dominated by the small sedge communities provides significantly less biomass – about 2–3 t/ha of the dry mass. Mowing formerly abandoned meadows annually significantly decreases the biomass yield.

Photo: Regimantas Vabuolas

ŽUVINTAS EXPERIENCE IN THE PRODUCTION OF BIOFUEL PELLETS

Žuvintas Biosphere Reserve in conjunction with local farmers raised a question – how to use biomass from the Žuvintas coastal wetlands? Most of the grassy surface consists of reeds or sedges which are not suitable for the forage. In terms of the biodiversity protection, harmful biomass should not be shredded and spread through the managed areas. This type of farming does not remove the biogenic substances from the wetlands causing rapid changes in the habitat structure and living conditions of invertebrates, and continually stored layer of the dead vegetation becomes a nuisance for the Sandpipers and other wet meadows birds (including the Aquatic warbler).

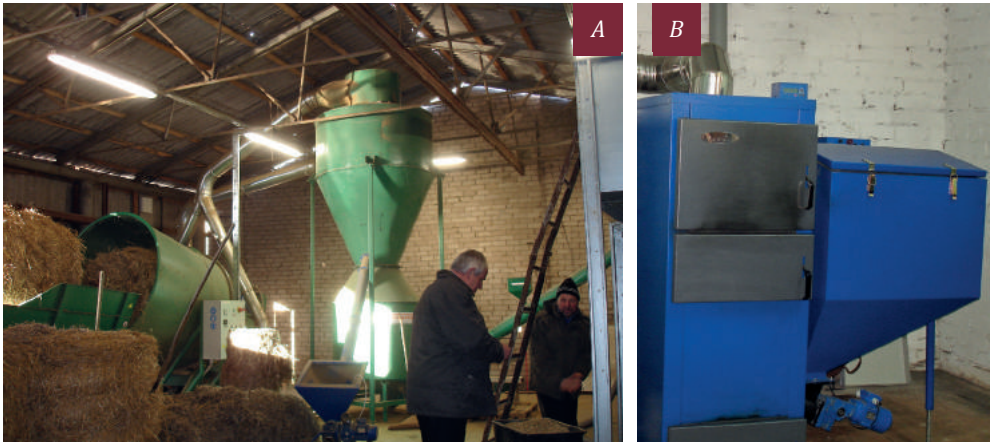
Another alternative has been chosen to solve the problem – use of the biomass for fuel or litter. Mowed Žuvintas wetland grass is dried in place. This saves a lot of energy because grass drying in a special dryer consumes about 30% of the energy required for the production of pellets. Granulation line becomes unprofitable if operated like this. Moreover, machine for the biomass drying costs about 35 000 EUR. Field dried biomass is twisted into rolls. Rolls are transported from the managed areas, stored and processed into pellets. Use of the unprocessed rolls for fuel was denied (even thought it is financially more beneficial) because the surrounding area does not have special boilers which are adapted to the roll stoking. Roll-stoked boiler plants are usually installed only by the large heat consumers.

Production of biomass briquettes was refused because briquettes are used only for fuel while pellets can be used as fuel, litter and even as fertilizer. In addition, pellet boilers are more sophisticated and require no regular maintenance.

Žuvintas lake shores have about 200 hectares of manageable wetlands, and granulation line capacity was calculated precisely in order to handle the biomass amount from this area (the average yield of grass – 5 t/ha, granulate 1000 t of biomass annually). It has been estimated that the line will work 20 days per month (8 hours per day), so – 1 920 h/year. Based on this data, equipment productivity would be 0.5 t/h. It was decided to choose a bit more powerful (0.7 t/h) granulating line to ensure consumption of the whole harvested biomass since experience of other companies shows that during the manufacturing process, practically processed biomass amount is lower than provided in the theoretical calculations.

At the moment administration building of Žuvintas Biophere Reserve Directorate is heated by the self-made pellets. Currently, due to the limited amount of produced pellets, administration cannot expect the economic benefits of product export to the main pellet market – Poland (sale price – around 70 EUR/t). If pellets are produced for litter, their market value is between 50 and 100% higher than the fuel granules. It is estimated that the granulation equipment would be profitable, if the daily production would amount to at least 3 tons of biomass pellets and if their exercise price would not be less than 70 EUR per ton.

Co-operation between farmers and Protected Areas' directorate during the implementation of the granulation line can bring benefits to both, farmers and environment: People farming in Žuvintas Biosphere Reserve may use undesirable biomass, and mowed lakeside mires will continue to attract breeding birds.



Granulation line (A) and bio-boiler (B) in the Directorate of Žuvintas Biosphere Reserve.

Photo: Jūratė Sendžikaitė

Photo: Žymantas Morkvėnas

The grass pellet boiler supplies heat to the Zuvintas Biosphere Reserve Directorate.

HOW TO REDUCE THE COSTS OF BIOMASS PREPARATION?

Even if the payments provided to farmers reimburse operating costs of meadow or wetland management, there are always ways to reduce the costs incurred. It can not only bring significant economic benefits but also reduce the use of resources and at the same time the negative impact on the environment. Agricultural machinery and transportation costs are the main factors that determine biomass preparation costs.

Agricultural machinery. If you have your own agricultural machinery – you are your own boss. However, it is recommended to keep in mind that the agricultural revenues must also cover the agricultural equipment depreciation costs.

Farmers who don‘t have agricultural machinery should co-operate. It will be so much cheaper to rent the equipment or even buy it. The larger area is planned to manage the lower will be the cost per hectare. It is also possible to buy used agricultural machines.

If it is decided to manage only the small areas of meadows and mires, then investing in agricultural machinery is not profitable. However, if the machinery would be used for the management of at least 200 hectares of meadows, and mowed at least twice per year (managed area of at least 400 hectares); the costs would be relatively acceptable. Thus, purchase of the machinery would be effective only if co-operating farmers had at least 400 ha of combined area to manage.

1 hectare of the grassland management services can amount to as much as 100 EUR. It is usually much more than can be obtained from the sale of biomass. If you do not have agricultural machinery – co-operate! This is one of the best solutions to reduce the cost of agricultural work. E.g. if the co-operating farmers with total grassland area of 200 hectares would purchase the necessary grass mowing, rolling, raking and pressing machinery together, which would serve at least 10 years (this machinery can be purchased for approximately 60 thousand euros), then the annual depreciation would amount to 30 EUR/ha. If grass would be mowed 2 times during the season then the depreciation costs would be even lower – only 15 EUR/ha/year. People working in wetlands can significantly reduce labor costs by mowing in the cold weather.

Photo: Žymantas Morkvėnas

Transportation. Transportation costs are an important factor affecting the profitability of farming. Normally, biomass is transported in trailers which can accommodate 10–12 t of biomass (this quantity can be prepared from 1.5–2 ha of the fertile land or 5–7 ha of average fertility polder meadows depending on mowing characteristics). Usually the 10 t trailer transportation cost for one kilometer is indicated. If it is not possible to transport in the 10 t volumes, the farmer's profit declines. Loss of profit depends on the transportation distance, managed territory, grassland yield and many other criteria. Transportation cost reduction is another good reason for the small farmers to co-operate.

Distance to the biomass buyer is a very important factor. In 2012–2014 the biomass transportation cost was about 1.16 EUR/km or 0.23 EUR/t, if transported by fully loaded 10–12 t trailer. Buyers offer to transport the biomass for similar price, so there is not much difference for the farmer, whether to transport the biomass by himself or use services of the company which is buying the biomass. If a farmer can choose where to transport the biomass, not only the distance but also the offered price should be taken into account. If the further located biomass buyer offers 3 EUR/t more for the same biomass, then the transportation for the farmer pays off only if the distance to the buyer is not more than 10 km longer compared to the one who offered lower price.

Photo: Žymantas Morkvėnas

Photo: Žymantas Morkvėnas

MULTIFUNCTIONAL AGRICULTURE

The credo of the small farmers-cheese industry: By farming, we strive to be in peace with ourselves and the environment, be happy and share happiness with others.

Recently agriculture is increasingly appreciated not only as an irreplaceable supplier of food and raw materials but also for many other additional features that promote social, economic and environmental well-being of people. Agriculture is considered to be multifunctional when without the commercial production (food, fiber, forage, raw energy materials, etc.) it performs one or even several other functions: preservation of natural resources, bioiversity and cultural heritage (traditions of ancient crafts); rich cultural landscape maintenance, food safety and quality assurance, eco-tourism supply, rural vitality, employment and stable levels of income, etc. (Bučinskas 2006).

Photo: Žymantas Morkvėnas

Multifunctional agricultural development sometimes referred to as a survival strategy help less productive farms to compete in the market (Marsden, Sonnin, 2008). Farmers working in large territories often cannot find place or time for other activities. At the same time, small and medium-sized farms direct their activities toward the latter because they provide certain competitiveness and advantage. Instead of quantity for the lowest price, the most important things become food quality, consumer health and cattle welfare; preservation of biodiversity, rural landscape, family farms, local cultures and rural traditions (Treinys, 2006).

They emphasize the following major agriculture and rural multifunctionality incentives which are mentioned in the Common Agricultural Policy reform legal texts: modernization of agricultural holdings, processing of agricultural products, support for the farmers, who are farming in less-favored areas and areas with environmental restrictions, village renewal, agri-environment (especially landscaping and the ecological agriculture programs), participation in the food quality schemes, development of the rural tourism, handicraft development, afforestation support, support for the restoration of damaged forests, ecological and recreational increase and support for the areas under the Natura 2000 program.

PRODUCTION PROVIDED BY THE MULTIFUNCTIONAL AGRICULTURE

(according to G. Bučinskas, 2006)

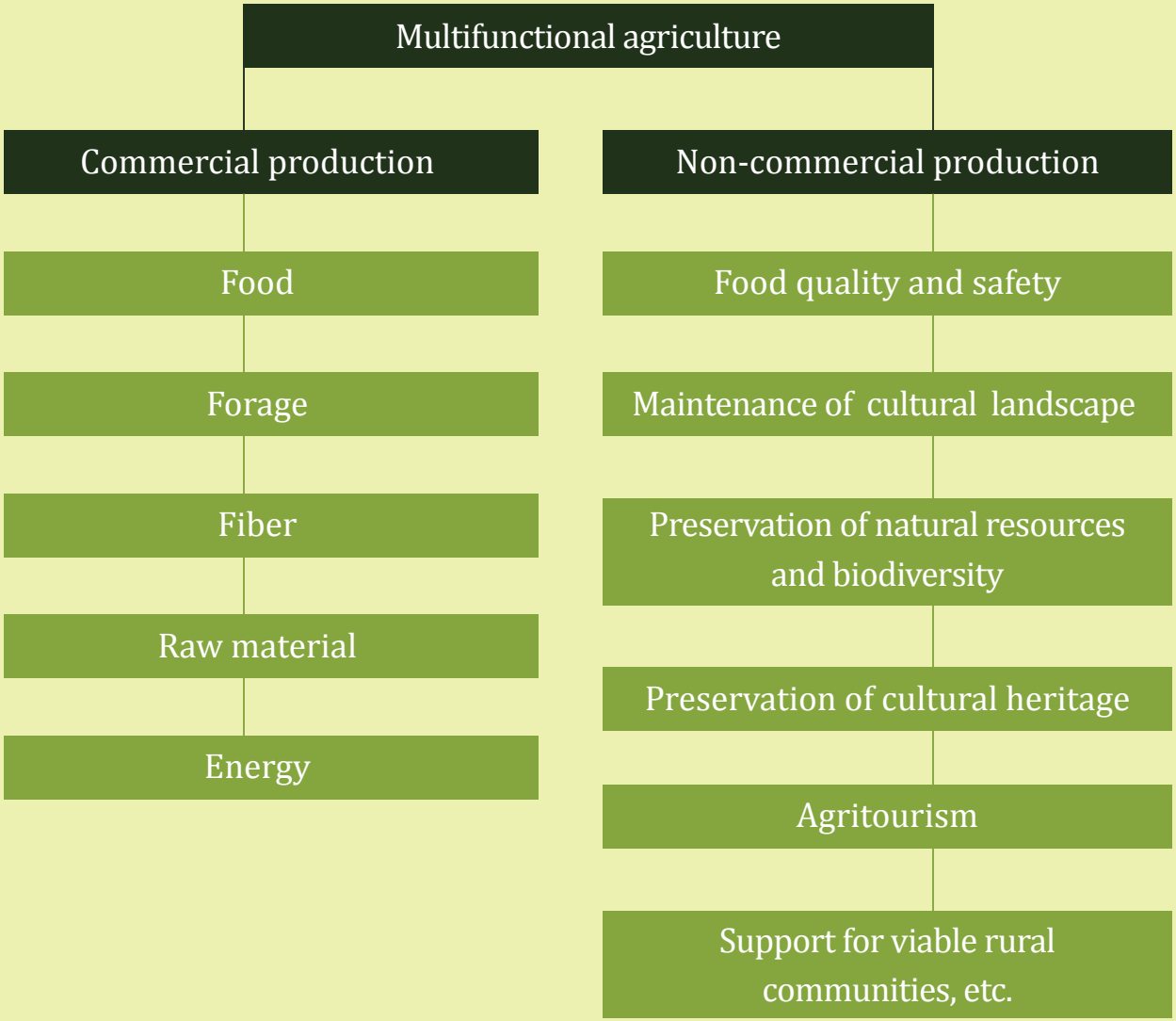


Photo: Žymantas Morkvėnas

PRODUCT OF NEMUNAS DELTA REGIONAL PARK

NATURE PROTECTION, FARMING AND TOURISM

Compensations and payments for farmers are only an intermediate station while reaching for a self-sustaining coherent system. Aspiration is regional / local economy managed in such way that all of its elements support each other economically and contribute to the overall prosperity while preserving the natural balance. In short – economy and nature thrives by complementing each other.

Potential linking part of such system is tourism, generating direct income for the region and farmer. The scheme is very simple: thanks to the farmer, flourishing nature attracts tourists and they purchase products and services from the local people. Revenues partially cover losses incurred by the environment friendly activities (the other part of the revenues comes from realization of the agricultural production). In this way, permanent state support is not required and region lives in a healthy and beautiful environment.

Of course, tourism (same as other activities) should also be developed in environment-friendly manner or, in other words, it should be based on the principles of ecotourism. They are very well illustrated by this comparison: ecotourism is a way to have a cake and eat it too. In order to maintain the existing natural values which are the primary condition to attract tourists, often it is necessary not only to engage in the sustainable farming, but also to give up mass tourism and to change the orientation of the business – compete in quality, not price.

Quality is often marked with the distinctive label. **Label of protected areas' product** is currently being used in Lithuania. Ethnographic bird symbol is used on the products or services, which were produced within the protected area by fostering the values of sustainable development. This label is given by the protected area directorate after the evaluation of service's eco-friendliness, quality, links with traditions and heritage. Products with bird symbol should be given special attention when presenting a region and local production should keep up with these products.

AN INSPIRING EXAMPLE: NATURE'S BEST CERTIFICATION SYSTEM

In Sweden services that meet very strict environmental criteria have a special ecotourism service label called "Nature's Best". The main feature of this labeling system is orientation to the evaluation and improvement process instead of the final certification. It promotes the development of responsible tourism even for those businesses which ultimately won't receive the certificate. During evaluation tourism service provider is being consulted by the ecotourism professional. They provide suggestions and recommendations regarding quality improvement and environmental issues. Currently 82 operators in Sweden have been awarded with the "Nature's Best" certificate. Among them an internationally recognized and globally known names. Certified companies work closely and offer joint tourism products.

More information:
http://www.naturesbestsweden.com/

Nature lovers are attracted to the areas where they can see rare species (such as Aquatic warbler, Great snipe and others), animal and bird abundance (such as bird gatherings during the spring migration in Nemunas Delta). In that sense the Nemunas Delta is a very attractive region. However, in many cases it is erroneously believed that setting up information stands, towers and parking areas will increase tourist flows. Of course infrastructure (at least minimal) is very important but the cornerstone of tourism development is services. If tourists will come to the Nemunas Delta, admire goose abundance during the spring migration, dip their feet in flood water, but will not spend any money by purchasing the local products (in supermarket purchased cookie which was produced abroad does not count) the region receives no economic benefit (unless moral – it provided an opportunity to enjoy nature, increased awareness about the region). Tourism in it's essence is sale of the tourism services, exchange but not a charity-based demonstration of values. So far, nature tourism services in the Nemunas Delta is poorly develo-

Photo: Žymantas Morkvėnas

Photo: Wildsweeden.com

ped – supply of accommodation and ships services is large, nature is enchanting but there is a lack of service providers who would understand and could show the wonders of nature

Creation of such services often becomes a challenge for Lithuanian regions. Development of ecotourism principles-based service requires considerable knowledge of nature and guide competence. Delicate nature of our region is different from African safari where people are willing to pay a lot of money for just a chance to see a lion or a giraffe. Good interpretation abilities are required in order to represent Lithuanian values, as well as experience to consider the route and create a full service proposal (consider including food, transport, leisure items, etc.). Perhaps you will find inspiration and assistance in the Baltic Environmental Forum website www.bef.lt which has one ecotourism service's creation process described in detail. Swedes have accumulated a lot of practice in this area.

AN INSPIRING EXAMPLE: WILDLIFE OBSERVATIONS IN SWEDEN

Observation of moose, wolves, bears, lynxes, beavers and other animals can be experience in Sweden. Wildsweeden.com offers memorable, one, several day or even a week-long trips. Professional guides are well familiar with the territory, animals, knows their movement routes and life rhythm. Escorted people have the opportunity to see animal from very close range. Professional services attract tourists from all over the world and receive the finest evaluations and awards. "Wild Sweden" has "Nature's Best" certificate.

Photo: Aivar Ruukel

Natural tourism can provide additional income for local farmers

A local resident, who knows the territory, birds and animals, their life cycles, is a real treasure for the visiting tourists. Such guide, who almost personally knows each animal, knows best which bird or animal you can get close to, which is better to observe from afar, how not to disturb it, where is the best place for such activities. In order to develop such services, specialists of protected areas who can provide advice on how to not disturb the animals and make no impact on the environment should be consulted. It is possible to prepare for getting to know animals by reading literature and spending a lot of time observing them. Emergence of such unique services would not only attract tourists and create jobs in the region, but also allow tourists to stay close to the nature and understand the value of nature preservation.

It is proposed to start the development of such services with less protected species (e.g. beaver safari, geese observation) and at the same time, after acquisition of experience and knowledge, to initiate a debate on the observation of rarer species.

Nature tourism lovers seek to observe animals or birds as close as possible. The diverse infrastructure, which does not interfere with the natural cycles and is adapted for observation is well known and successfully used around the world. Access to this infrastructure is not free which allows not only to maintain the created infrastructure but also to invest in new tourism services.

Photo: Žymantas Morkvėnas

AN INSPIRING EXAMPLE: NATURE TOURISM DURING FLOOD IN ESTONIA

In Soomaa national park, Estonia, Spring flood season is called The Fifth season when the territory turns into an Estonian Amazon. Tourists from all over the world come to see this unique natural phenomenon that is similar to the floods in Nemunas Delta.

During this time of the year every day a local guide Aivar Ruukel together with his partners lead special canoes excursions lasting about 2-3 hours (about 7 km long) in flooded meadows and forests. A tourist pays 20 EUR to rent a kayak. Additionally, 20 EUR are paid for guiding services. This service is very popular. Tourists follow the information on the website www.soomaa.com or Facebook in order to know when the flood is coming so they could plan the trip.

In addition to kayak excursions, Aivar Ruukel offers other experiences in nature such as night-trips, mushroom and berry picking trips, bog restoration workshops, bog-shoeing using swamp shoes (adapted snow shoes) and wilderness day-trips.

Aivar Ruukel together with other locals prepare complex tour offers that include accommodation, local food tasting and experiences in nature. The tour operator with colleagues have visited Nemunas Delta a few times and even made suggestions and recommendations for local tourism service providers.

Maybe it is a time to start the Fifth season in Nemunas delta?

Photo: „Freedom of Adventure“

Tourism operator Alvar Ruukel

Photo: Ojar Kristal, Soomaa.com, „Freedom of Adventure“

RECOMMENDATION

One of the world's foremost nature photographers, ecotourism expert Staffan Widstand noted that the Nemunas Delta tourism operators could make use of opportunities created by setting up bird watching hides. He provided guidelines on how to set up such hides. Rent of the bird watching hides for nature photography is quite successful business in foreign countries and they do not harm the environment if set up correctly. Crucial thing – to choose the most appropriate location for observation.

Photo: Žymantas Morkvėnas

Photo: Žymantas Morkvėnas

AN INSPIRING EXAMPLE: OVERNIGHT IN TREE HOUSES IN SWEDEN

"Urnatur" offers unique and very popular accommodations in Sweden. Their apartments are tree house cabins in the middle of the forest. Minimum facilities, no electricity and wildlife – that's what fascinates the visitors. Price starts at 163 euros per night. It includes accommodation, 2 dinners, bath, shower and breakfast. All production is made on the spot because the owners have an eco-farm. "Urnatur" is certified with "Nature's Best" brand and closely cooperates with the other entities in this network, e.g., "Wild sweeden".

Photo: Upaite.lt

Local drinks presented in cups with the image of Aquatic warbler

Direct tourism benefits for farmers. With the development of nature tourism services, farmers should feel the immediate benefits. First of all – through sale of their products. Fresh milk and fish for tourists are desirable food products, representing the seaside region. Those who wish to develop such activities can receive support from the Rural Development Programme, specially designed to compensate 30–50% of the actual costs incurred by investing in the organic agricultural production processing, marketing and development. More information can be found in the Rural Development Programme. Use of farmer's land for tourism is yet another direct source of income for farmers. Tourism operators, who wish to show the plant or animal species living in the farmer's territory, can conclude an agreement regarding visiting or installation of the special infrastructure in the area and to pay an agreed fixed fee.

Nemunas Delta tourism is moving forward. Recently, first attempts to develop nature tourism services have appeared in the Nemunas Delta area. Organization of the festival "In the middle of the waters" provided space for the tourism operators to introduce themselves and for the local farmers or craftsmen to market their products. In other words, event and the opportunity to participate in bird-watching was sort of premise for the local businesses to make money. Some tourism service providers offer complete tourist services with purely local production. Part of the accommodation providers also offer locally produced breakfast. It is gratifying that tour operators promote their services through the exceptional natural values – strictly protected species.

Focus on unified communication. In order to sell the developed tourism products and create a positive Nemunas Delta image as a tourist attraction area, it is necessary to focus on a unified region communication. All messages, communication tone and main emphasis should be coordinated and complement with one another. For a tourist, from the very first contact with the area (it can be searching for the information online or reading an article in press), its uniqueness, easily accessible and consistent information on the tourist services have to be clear. One comprehensive and user-friendly information source (e.g. website) would be a real advantage. If the website provides an opportunity to order services for the entire journey, it is ideal. Attention should be paid to the visual presentation – the use of professional, emotional pictures. During the visit in the region, tourist should be fully informed about the possible services. The best would be to get information in every accommodation, catering and tourism office.

INSPIRING EXAMPLES: PRESENTATION OF LOCAL PRODUCTION

In the website of Slovenian Goricke Regional Park, near the tourist attractions you can find information about what exceptional regional food and household supplies can be purchased from the people living in the park. In addition to the fresh and dried fruits, vegetables and grains, cheese and oil, honey, bread and meat, as well as carefully collected herbal tea, you can find thrown pots, wicker baskets, woven tablecloths or erasers. Also blacksmiths and shoemakers offer their services; you can order clay bricks or even find a reed roofing specialist.

Similarly ecological farming is encouraged and in the Muritz National Park (Germany). In this laky region tourists are offered not only to try organic food, grown in organic farm cooperative, but also to taste fish caught in the local lakes.

Photo: Staffan Widstand

Photo: Aivar Ruukel and Upaite.lt

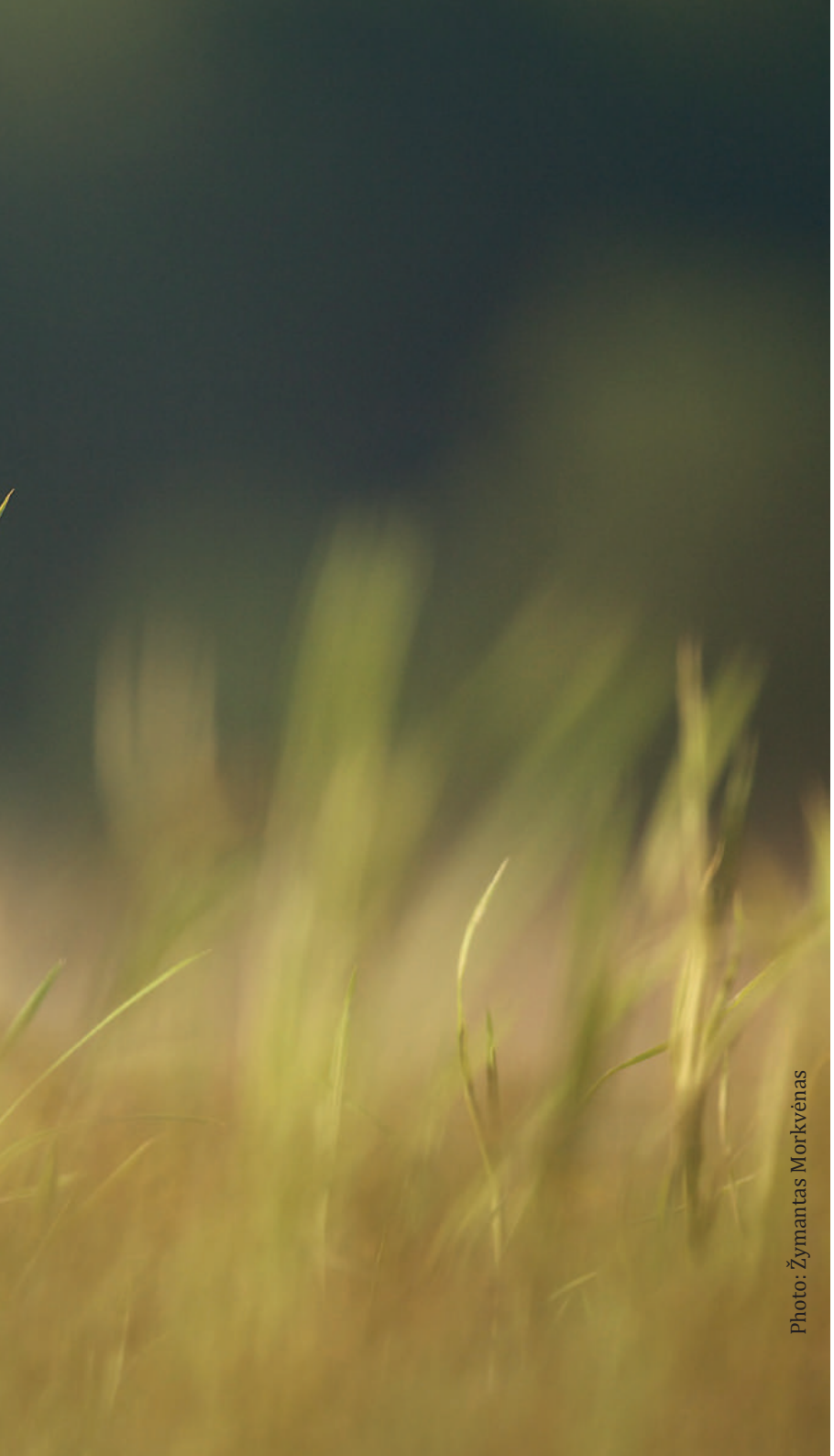


Photo: Žymantas Morkvėnas

CONCLUDING REMARKS

The fate of globally endangered Aquatic warbler breeding in Nemunas delta and it's specific living environment highly depends on a good will of farmers. It is not easy to align the interests of both the bird and the farmer, but it is possible. The existing compensation system and models of economic activity (production of grass pellet, agricultural products, tourism services and etc.) help to deal with that. Most importantly, you have to decide to start farming in environmentally friendly way. You will always find help, advice and information needed for development of economically viable business model if you contact Baltic Environmental Forum Lithuania (www.bef.lt).

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