INSPECTION OF ENVIRONMENTAL PROTECTION

Methodology of nature monitoring

Methodological guide for:

Natural habitats:
91E0 Willow, poplar, alder and ash riparian forests *Salicetum albae, Populetum albae, Alnenion glutinoso-incanae*, spring alder forests

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91E0 **Willow, poplar, alder and ash riparian forests** *Salicetum albae*, *Populetum albae*, *Alnenion glutinoso-incanae*, spring alder forests

Photo 1 A typical riparian alder forest – Polnica valley in Pomerania (© P. Pawlaczyk)

I. INFORMATION CONCERNING THE NATURAL HABITAT

1. Phytosociological identifiers

class: *Salicetea purpureae* - willow riparian forests and willow bushes
- order: *Salicetalia purpureae*
  - alliance: *Salicion albae* - willow riparian forests
    - *Salicetum albae* - willow riparian forest
    - *Populetum albae* - poplar riparian forest

class: *Querco-Fagetea* - deciduous forests
- order: *Fagetalia sylvaticae* - mesotrophic and eutrophic deciduous forests
  - alliance: *Alno-Ulmion* - alder riparian forests
  - sub-alliance: *Alnenion glutinoso-incanae*
    - *Fraxino-Alnetum* - lowland ash-alder riparian forest
    - *Stellario nemorum-Alnetum glutinosae* – stitchwort riparian forest
    - *Carici remotae-Fraxinetum* - submontane ash riparian forest
    - *Alnetum incanae* - riverside montane alder forest
    - *Caltho-Alnetum* - montane alder swamp forest

In addition, habitat 91E0 comprises alder forests in spring areas – irrespective of their phytosociological classification. Some of them have the form of streamside alder-ash forests Fraxino-Alnetun and some resemble alder forests ("spring alder forests"- "Cardamino-Alnetum").

2. Description of the natural habitat

A natural habitat of this type includes riverside forests: alder, ash, white willow, brittle willow, silver poplar and black poplar. They grow in all parts of Poland, but in specific locations they are represented by different subtypes.

The above-mentioned forests develop on soils flooded by river water, with a high level of groundwater, classified mainly as post-bog soils or floodplain alluvial soils. In accordance with its definition, this habitat comprises several quite different subtypes of tree stands, including: ash-alder stands in spring areas and the related water courses, alder stands in valleys of fast flowing rivers, alder forests growing along slowly flowing streams, montane grey alder forests and riverside willow and poplar forests on the banks of large rivers.

Periodic flooding is a typical but not necessary feature of riparian forests: patches of riparian forests also develop in non-flooded areas under the influence of moving groundwater.
The definition of habitat 91E0 includes almost precisely:

- Riparian forests of the *Querco-Fagetea* class, *Fagetalia sylvaticae* order, *Alno-Ulmion* alliance and *Alnenion glutinoso-incanae* sub-alliance (stands of *Ulmenion minoris* sub-alliance are classified as a separate entity with code 91F0)
- Riparian forests of the *Salicetea purpureae* class, *Salicetalia purpureae* order and *Salicion albae* alliance.

Lowland alder forests from spring areas are also included here, even though from a syntaxonomic point of view they do not constitute a homogeneous group and some of their forms should be classified as communities of the *Alnetea glutinosae* class, because alder species prevail over riparian forests of the *Querco-Fagetea* class. Irrespective of their systematics, such a classification is justified by the ecological relationships of these ecosystems with flowing water and river valleys.

The natural habitat 91E0 does not include riparian forests from the Baltic region described as the *Pruno-Fraxinetum* association from the *Alno-Ulmion* alliance and *Alnenion glutinoso-incanae* sub-alliance. It seems that the ecology of these tree stands is mostly determined by factors associated with their seaside location, including the dynamics of dunes. Forests of this type qualify as natural habitat 2180.

The typology of forest habitats may be confusing: habitat 91E0 is not only associated with habitat type Ł, but mostly with habitat type OlJ and Ol.

Photo 2 A riparian alder forest with ostrich ferns in the Forest District of Lubsko in the Lower Silesian Wilderness (© A. Jermaczek)

Photo 3 A spring riparian forest (© P. Pawlaczyk)

Photo 4 A spring riparian forest in the Karwickie Springs Reserve in Pomerania (© J. Kujawa-Pawlaczyk)

Photo 5 A riparian alder forest (91E0) with blackcurrants growing in spring areas in the Beech Forest Wilderness near Szczecin (© P. Pawlaczyk)

3. Ecological conditions

The main ecological factor that determines the specific character of riparian forests is water conditions – in particular those connected with the vertical and horizontal movement of water. The specific character of particular subtypes of this habitat depend on the frequency and duration of floods and on the movements of groundwater, such as soaking in and flowing out.

Most subtypes of the habitat are characterized by periodic flooding. Willow and poplar riparian forests are typical for larger river valleys. Willow riparian forests are usually flooded every year, the poplar ones – every several years. However, they are also known to grow in non-typical locations, for example, on the shores of lakes.

Alder and alder-ash riparian forests are typical for valleys of smaller water courses. They may be flooded periodically or may not be flooded at all – in the latter case, however, they are affected by groundwater movements. In some places, water may tend to stagnate and the habitat may turn into a boggy swamp, which is a common feature of alder forests and alder swamps. Alder riparian forests too may occur in atypical locations unconnected with water courses, for example, on the shores of lakes.

In the mountains, the ecological equivalent of riparian alder forests growing on the banks of rivers is grey alder forests.

Habitat 91E0 also comprises swamp alder forests in mountain areas, which are mostly influenced by vertical groundwater movements and stagnant water.

Submontane ash riparian forests usually remain non-flooded, but they are affected by moving groundwater. They can be encountered not only in the mountains, but also in isolated lowland locations.

Spring alder forests, sometimes of a riparian-alder character, develop in places where underground water soaks through or flows out – e.g. on copulas of soligenic bogs and in wellspring circuses.

Photo 6 A submontane ash riparian forest (91E0) in lowlands - in the Beech Forest Wilderness near Szczecin. It forms narrow strips along water courses, among beech forests (9130). (© P. Pawlaczyk)

Photo 7 A montane alder forest (© W. Mróz)

Photo 8 Swamp alder wood (Caltho-Alnetum) in Gorce. (© Jan Loch)

Photo 9 A montane riparian forest with grey alders and brittle willows (91E0) at the Jasiołka River Gorge. (© M. Węgrzyn)

4. Typical plant species

91E0 riparian forests are ecologically and geographically very diverse. As a result, the “natural” species composition of their undergrowth is very diverse too. There are virtually no species demonstrating fidelity to riparian forests and there are no riparian forest species that could serve as

a universal indicator of the conservation status of habitat 91E0. It is difficult to rely on the concept of characteristic species in a phytosociological sense, because they do not, as a general rule, demonstrate fidelity to well-preserved riparian forests and they are not common for different subtypes, forms and varieties (ecological or regional / local) of natural habitat 91E0.

The tree species regarded to be typical for this habitat include: black alder *Alnus glutinosa*, European ash *Fraxinus excelsior*, white willow *Salix alba*, brittle willow *Salix fragilis*, silver poplar *Populus alba* and black poplar *Populus nigra*.

The undergrowth species (often together with bushes) which are most often encountered in this habitat include: ground elder *Aegopodium podagraria*, yellow wood anemone *Anemone ranunculoides*, common lady-fern *Athyrium filix-femina*, hedge bindweed *Calystegia sepium*, elongated sedge *Carex elongata*, beaked sedge *Carex rostrata*, hairy chervil *Chaerophyllum hirsutum*, alternate-leaved golden-saxifrage *Chrysosplenium alternifolium*, Alpine enchanter's nightshade *Circaea alpina*, broad-leaved enchanter's nightshade *Circaea lutetiana*, common hazel *Corylus avellana*, hemp-agrimony *Eupatorium cannabinum*, giant fescue *Festuca gigantea*, lesser celandine *Ficaria verna*, alder buckthorn *Frangula alnus*, cleavers *Galium aparine*, common marsh bedstraw *Galium palustre*, water avens *Geum rivale*, common hop *Humulus lupulus*, touch-me-not balsam *Impatiens noli tangere*, yellow iris *Iris pseudacorus*, yellow archangel *Lamiastrum galeobdolon*, gypsywort *Lycopus europaeus*, garden loosestrife *Lysimachia vulgaris*, purple loosestrife *Lythrum salicaria*, bird cherry *Padus avium*, reed canary grass *Phalaris arundinacea*, blackcurrant *Ribes nigrum*, European dewberry *Rubus caesius*, glutinous sage *Salvia glutinosa*, common skullcap *Scutellaria galericulata*, bittersweet nightshade *Solanum dulcamara*, hedge woundwort *Stachys silvatica*, wood stitchwort *Stellaria nemorum*, common comfrey *Symphytum officinale* and common nettle *Urtica dioica*.

However, the above-mentioned species are not suitable as indicators of the conservation status of riparian forests. In the case of natural habitat 91E0, the concept of “phytosociologically characteristic” species as an indicator of the condition of the entire habitat does not work very well – instead, one should rely on a comprehensive assessment of how typical the flora composition is, and on the selection of “species locally typical for the habitat (taking into account the specific characteristic of a given location) which are of key importance for its biodiversity” (plant species and animal species alike).

5. Distribution in Poland

The habitat occurs all over Poland and is one of the most common Natura 2000 habitats. This applies in particular to ash-alder riparian forests, and in the mountains – to montane alder forests. Other subtypes of the habitat (willow and poplar riparian forests, submontane ash riparian forests, spring alder forests and swamp alder forests in the mountains) are not distributed evenly and may be rare.

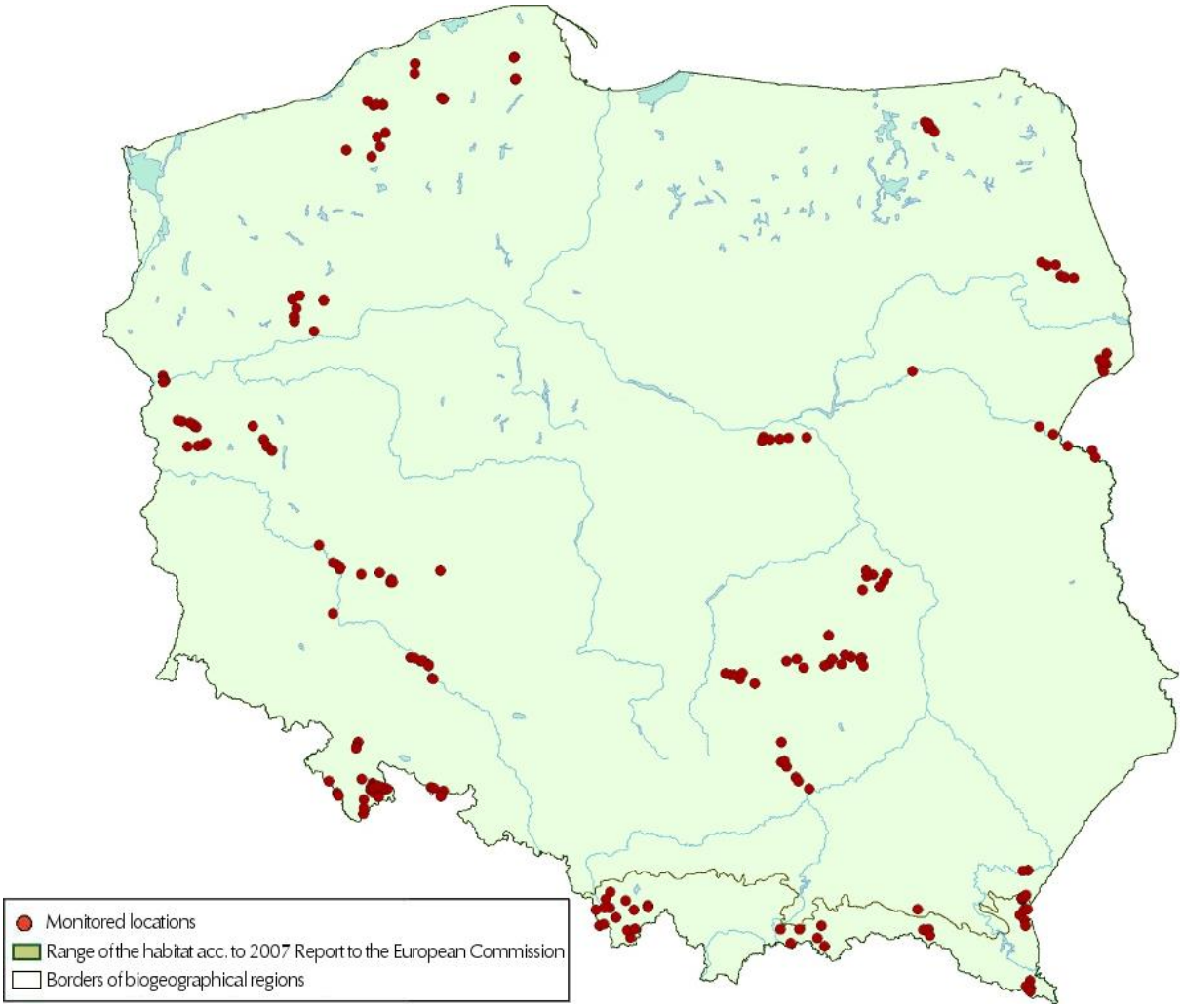

Fig. 1 Distribution of the habitat sites in Poland (revised to take into account the monitoring data from 2006-2008)

II. METHODOLOGY

1. Methodology of monitoring studies

Selection of monitored locations

Monitoring at an area level (Natura 2000 site, national park, and landscape park) must cover the habitat in its entire diversity, both in terms of plant alliances and conservation status. Efforts should be made to establish sites in patches representing at least 20-50% of the total acreage of the habitat in the area, with the lower limit mostly relating to areas where riparian forests are very numerous. A site should be understood as a habitat patch which is relatively homogeneous in terms of the plant association, water regime and the degree of distortion. The set of sites should be selected in such a way so that it is representative for habitat resources in a given area.

Study method

The most suitable monitoring area is a transect with a length of 200 m and a width of 10 m. Within this transect, 3 phytosociological relevés must be performed, each with an area of 100 m^2. If the transect does not fit into the habitat patch, its dimensions should be modified without altering its area.

The location of the site should be presented on a 1:10000 topographic map, a forest economic overview map or a 1:5000 orthophotomap, with delineated boundaries of the area classified as habitat 91E0.

Time and frequency of studies

The best time for studying riparian forests depends on their specific local character. It usually covers the period from mid-May to September. An additional observation of floodings in the period of high water levels in spring can be very useful too. In general, it is best to perform studies in late spring and early summer (if the area is accessible). Alder forests in the mountains, on the other hand, can be monitored throughout summer or even in autumn until mid-October. Studies at monitoring sites should be carried out at least once every 5-6 years, preferably every 3 years.

Equipment used in studies

In order to obtain reliable and valuable data concerning water conditions, monitoring activities should be accompanied by simultaneous recording of the level of water in the ground / flooding level. An alternative method is to register the level of the water course sustaining a given riparian forest, provided that a relation between that level and the pattern of riparian forest floodings is established on the basis of at least several flooding episodes. One can also rely on the data of a water gauging station, if there is one nearby. In other cases, it is recommended to install a limnigraph on the water course, or to install in the ground a piezometer equipped with a device for automatic registration of the water level (e.g. the so-called MiniDiver with simultaneous measurement of both the level and the temperature of water - with any frequency in a period of about 10 years, with measurement storage capacity of up to 24 thousand – all one has to do then is to collect the readings during the next monitoring observation). In addition, an atmospheric pressure sensor is also required (one is usually sufficient for the entire Natura 2000 site). It should be installed in a nearby forester's lodge, house, etc.

2. Assessment of parameters of the conservation status of a natural habitat and the indicators of its specific structure and functions

Table 1 Description of the specific structure and functions of the natural habitat and of the parameter "conservation prospects" for natural habitat 91E0 - willow, poplar, alder and ash riparian forests

Parameter Indicator	**Description**
Surface area of the habitat	An assessment should be carried out of trends of changes in the surface area of the habitat and its anthropogenic fragmentation (caused, for example, by agricultural use of a part of the potential biochore of riparian forests) due to wood cutting, division of the habitat by dykes, roads, etc. A situation in which patches of riparian forests are divided by a river-bed, river-beds or oxbow lakes should not be regarded as fragmentation.

Parameter Indicator	Description
Specific structure and functions	
Characteristic species	The tree species which are usually mentioned as typical for this habitat include: black alder Alnus glutinosa, European ash Fraxinus excelsior, white willow Salix alba, brittle willow S. fragilis, silver poplar Populus alba and black poplar P. nigra. The undergrowth species (often together with bushes) which are most often encountered in this habitat include: ground elder Aegopodium podagraria, yellow wood anemone Anemone ranunculoides, common lady-fern Athyrium filix-femina, hedge bindweed Calystegia sepium, elongated sedge Carex elongata, beaked sedge C. rostrata, hairy chervil Chaerophyllum hirsutum, alternate-leaved golden-saxifrage Chrysosplenium alternifolium, Alpine enchanter's nightshade Circaea alpina, broad-leaved enchanter's nightshade C. lutetiana, common hazel Corylus avellana, hemp-agrimony Eupatorium cannabinum, giant fescue Festuca gigantea, lesser celandine Ficaria verna, alder buckthorn Frangula alnus, cleavers Galium aparine, common marsh bedstraw G. palustre, water avens Geum rivale, common hop Humulus lupulus, touch-me-not balsam Impatiens noli tangere, yellow iris Iris pseudacorus, yellow archangel Lamiastrum galeobdolon, gypsywort Lycopus europaeus, garden loosestrife Lysimachia vulgaris, purple loosestrife Lythrum salicaria, bird cherry Padus avium, reed canary grass Phalaris arundinacea, blackcurrant Ribes nigrum, European dewberry Rubus caesius, glutinous sage Salvia glutinosa, common skullcap Scutellaria galericulata, bittersweet nightshade Solanum dulcamara, hedge woundwort Stachys silvatica, wood stitchwort Stellaria nemorum, common comfrey Symphytum officinale and common nettle Urtica dioica. Evaluating the characteristic flora combination, one should take into account the phytosociological diversity of this type and analyse separate sets of species for particular subtypes of the natural habitat (on the basis of Herbich et al. 2004): **Riverside willow riparian forest Salicetum albae** Apart from white willow Salix alba and brittle willow S. fragilis, other relatively constant components of the riparian forest include: hedge bindweed Calystegia sepium, cleavers Galium aparine, garden loosestrife Lysimachia vulgaris, reed canary grass Phalaris arundinacea, great yellowcress Rorippa amphibia, creeping buttercup Ranunculus repens, European dewberry Rubus caesius, almond-leaved willow Salix triandra, comfrey Symphytum officinale and common nettle Urtica dioica. Only nettles and blackberries form facies assemblages. **Riverside poplar riparian forest Populetum albae** The structure of fully natural Populetum albae phytocoenoses, which are at the optimum stage of development of the forest ecosystem, is unknown, making it difficult to specify representative species. Such representative species most certainly include the white poplar Populus alba, black poplar P. nigra and grey poplar Populus x canescens. Other representative species may include relatively constant components of the undergrowth: couch grass Agropyron repens, mugwort Artemisia vulgaris, creeping thistle Cirsium arvense, field horsetail Equisetum arvense, common hemp-nettle Galeopsis tetrahit, cleavers Galium aparine, ground-ivy Glechoma hederacea, European dewberry Rubus caesius and common nettle Urtica dioica. **Alder-ash riparian forest** Black alder Alnus glutinosa, European ash Fraxinus excelsior, bird cherry Padus avium, touch-me-not balsam Impatiens noli-tangere, common nettle Urtica dioica, yellow archangel Galeobdolon luteum, wood stitchwort Stellaria nemorum, alternate-leaved golden-saxifrage Chrysosplenium alternifolium, broad-leaved enchanter's nightshade Circaea lutetiana, common lady-fern Athyrium filix-femina, garden loosestrife Lysimachia vulgaris. **Spring alder forests in lowlands** Black alder (Alnus glutinosa), large bitter-cress (Cardamine amara), dog's mercury (Mercurialis perennis), alternate-leaved golden-saxifrage (Chrysosplenium alternifolium). **Submontane ash riparian forest** European ash Fraxinus excelsior, grey alder Alnus incana, wood ragwort Senecio Fuchsii, hedge woundwort Stachys sylvatica, common nettle Urtica dioica, hairy chervil Chaerophyllum hirsutum lub touch-me-not balsam Impatiens noli-tangere. Frequently occurring species include great masterwort Astrantia major, European meadow sedge Carex remota, upland enchanter's nightshade Ciracea intermedia, great horsetail Equisetum telmateia, ornamental sorrel Rumex sanguineus, asarabacca Asarum europaeum, wood anemone Anemone nemorosa, woolly buttercup Ranunculus lanuginosus, giant fescue Fagus sylvatica, dog's mercury Mercurialis perennis, ground elder Aegopodium podagraria and wood speedwell Veronica montana. **Riverside montane alder forest Alnetum incanae** • Characteristic species: dusky crane's-bill Geranium phaeum, grey alder Alnus incana (regionally in the Sudetes, in tiers at the foothills of the Carpathian Mountains). • Species of high fidelity but with a limited range: ostrich fern Matteucia struthiopteris, spring snowflake Leucoium vernum.

Parameter Indicator	**Description**
	• Characteristic species, in tiers (in lower locations): great marsh thistle Carduus personata, greater meadow-rue Thalictrum aquilegifolium. • Distinctive species in the Carpathian Mountains: shining chervil Anthriscus nitida, stinking woodsalad Aposeris foetida (both in Bieszczady), wood spurge Euphorbia amygdaloides, glabrous butterbur Petasites kablikianus, butterbur P. hybridus, glutinous sage Salvia glutinosa, heart-shaped comfrey Symphytum cordatum, coltsfoot Tussilago farfara, heartleaf oxeye Telekia speciosa (Bieszczady). • Other frequently occurring species: ground elder Aegopodium podagraria, hairy chervil Chaerophyllum hirsutum, cabbage thistle Cirsium oleraceum, marsh hawk's-beard Crepis paludosa, mead wort Filipendula ulmaria, water avens Geum rivale, touch-me-not balsam Impatiens noli-tangere, yellow pimpernel Lysimachia nemorum, wood bluegrass Poa nemoralis, wood stitchwort Stellaria nemorum, common nettle Urtica dioica. **Montane alder swamp forest** Grey alder Alnus incana, montane marsh-marigold Caltha laeta subsp. laeta, hairy chervil Chaerophullum hirsutum, yellow pimpernel Lysimachia nemorum, Carpathian valerian Valeriana simplicifolia, wood club-rush Scirpus sylvaticus, marsh hawk's-beard Crepis paludosa, water forget-me-not Myosotis palustris, white butterbur Petasites album. This indicator should be treated as cardinal; however, it is not as much the number of characteristic and typical species that should be assessed, but the character of the whole flora composition, by comparing it to the composition of the best preserved riparian forests in the area. For assessing the conservation status of an area as satisfactory, it should be required that at least 25% of sites have a satisfactory conservation status.
Dominant species	Depending on the specific plant community, it is proposed to assume that each patch must be dominated by species which are typical for a given habitat-variant (i.e. for a given plant community) in order to be classified as having a satisfactory conservation status). In the case of riparian forests, it should be treated as a cardinal indicator. For assessing the conservation status of an area as satisfactory, it should be required that at least 75% of sites have a satisfactory conservation status.
Geographically alien species in the tree stand	All species outside their natural range should be treated as geographically alien species, taking into account the present state of knowledge. During the observations carried out in riparian forests thus far the following geographically alien species were discovered: Euro-American poplars, green ash, spruce (in Pomerania) and, in higher mountains – black alder (derived from plantings). The assessment of the indicator should be downgraded if the presence of an alien species is more than sporadic, especially when its generational replacement occurs. The presence of 1-2 specimens of an alien species is acceptable even in a patch assessed as FV. This indicator should have an auxiliary character. For assessing the conservation status of an area as satisfactory, it should be required that at least 90% of sites have a satisfactory conservation status.
Invasive alien species in the underbrush and forest floor vegetation	The riparian forest ecosystems are highly susceptible to neophytisation; therefore the problem of invasive alien species is significant and quite often mentioned in records. The species mentioned there include: small-flowered touch-me-not Impatiens parviflora, kiss-me-on-the-mountain Impatiens glandulifera, devil's beggarticks Bidens frondosa, wild cucumber Echinocystis lobata, late goldenrod Solidago gigantea, five-leaved ivy Parthenocissus quinquefolia, Asian knotweed Reynoutria japonica, giant knotweed Reynoutria sachalinensis. In most areas, this indicator was assessed as "unsatisfactory" and in a few areas even as bad. Every geographically alien species in the undergrowth must be recorded in the observation sheet, but its assessment can only be downgraded when such a species is invasive locally. It is proposed to assume that the site must be free from invasive alien species in the undergrowth in order to be classified as having a satisfactory conservation status. This indicator should be treated as cardinal. For assessing the conservation status of an area as satisfactory, it should be required that at least 90% of sites have a satisfactory conservation status.
Native expansive species of herbaceous plants	The species of expansive apophytes that occur in riparian forests include, for example: blackberries, tufted hairgrass, nettles and ground elder. The assessment is downgraded when there is clear expansion of one of the species which are atypical for well-preserved patches of the habitat (so strong that it limits the development of other undergrowth species). The expansion (if any) of neophytes (geographically alien species) should not be taken into account here, because it is measured with a different indicator. It is proposed to assume that the site must be free from expansive apophytes in the undergrowth in order to be classified as having a satisfactory conservation status. This indicator should have an auxiliary character. For assessing the conservation status of an area as satisfactory, it should be required that at least 75% of sites have a satisfactory conservation status.

Parameter Indicator	**Description**
Deadwood	This indicator is used for assessing the stocks of decaying wood in the ecosystem. According to contemporary knowledge of ecology, it is an element of the structure of the forest ecosystem which is of key importance for biodiversity (however, the quality characteristics of the stocks of decaying wood must also be taken into account; the latter can at least partially be measured with the indicator "standing and of lying deadwood" of a length of >3m and thickness of >50 cm). The calculation must include deadwood and parts of lying and standing trees with the diameter at the thinner end of at least 7 cm; tree stump are excluded. During the monitoring conducted in the years 2006-2011 and during nature inventorying carried out in State Forests in 2007, the volume of deadwood was estimated visually as the proportion of the "volume of deadwood compared with the volume of live trees", using percentage intervals (required to be assessed as U1) and 10% (required to be assessed as FV). In future monitoring activities, the above measurement method is to be replaced by measurement of the absolute quantity of decaying wood performed on the surface of the transect (usually 0.2 ha) by counting and adding the volumes of its particular fragments, expressed in m^3/ha. This indicator is to be calibrated as in most other types of forest ecosystems. The suggestions and experience of other European countries have also been taken into account (compare a problem analysis in Muller and Butler 2010), as well as the fact that most forests forming the natural habitat concerned are commercial forests. The threshold volume considered to be "satisfactory" (20m^3 of deadwood per ha of forest) is still about 2 times lower than the stocks of deadwood which is scientifically known to be necessary for undisturbed development of communities of xylobiotic organisms in European lowland deciduous forests. Therefore, in protected areas (national parks, nature reserve) or in specially established preserves of biodiversity in State Forests (reference areas, refuge areas for xylobiotic species) dead and dying trees should not be removed even when this threshold value is considerably exceeded. In riparian forests – just as in most other forest ecosystems – it will serve as an auxiliary indicator. In order for the conservation status to be assessed as satisfactory, the average value in patches of the natural habitat should exceed the threshold for acceptable results (evaluation can be performed using the data collected during forest planning, in accordance with the forest planning instructions which have been in force since 2011; the instructions comprise the method for measuring the volume of deadwood). At sites identified as subtypes 91E0-6 and 91E0-7, it is an auxiliary indicator, i.e. it should be evaluated, but without being taken into account in the evaluation of the parameter "specific structure and functions".
Large-size deadwood	Irrespective of the total stocks of decomposing wood, it is very important to establish their quality. In most forest ecosystems, there is a shortage of large-dimension wood. Xylobiotic species connected with thick decomposing logs belong to the most endangered species. Therefore, it was decided that the quantity of thick, decomposing wood should be evaluated as a separate indicator. The indicator measures the thickness of logs and standing tree trunks – an indispensable microhabitat for the most demanding xylobiotic organisms. It takes into account logs and standing tree trunks with a length of >3m and thickness of >50 cm, measured as a diameter at breast height, if measuring is possible, or at the thicker end of the log. If in a given patch of the habitat trees do not grow to such large sizes due to natural causes, the thickness threshold is reduced to 30 cm. A given area should be measured using a counting method. In riparian forests – just as in most other forest ecosystems – it will serve as a cardinal indicator. For assessing the conservation status of an area as satisfactory, it should be required that at least 25% of sites have a satisfactory conservation status. At sites identified as subtypes 91E0-6 and 91E0-7, it is an auxiliary indicator, i.e. it should be evaluated, but without being taken into account in the evaluation of the parameter "specific structure and functions".
Natural character of the river-bed (to be used only for riparian forests associated with water courses)	This indicator is used only for riparian forests associated with natural water courses. The indicator relates to traces of an anthropogenic transformation of the basin of such a water-course system. This indicator should have an auxiliary character. For assessing the conservation status of an area as satisfactory, it should be required that at least 75% of sites have a satisfactory conservation status.

Parameter Indicator	**Description**
Water regime (including the rhythm of floods, if exists)	riparian forests and it should be treated as a cardinal indicator. What is essential to remember, however, is that particular types of riparian forests differ with their "natural flooding rhythm", whereas the surface of some of them (swamp alder forests in the mountains, spring riparian forests, some forms of ash-alder riparian forests) is not flooded at all, as they rely instead on groundwater movements. Such forests are affected by over-saturation of their stratum with water rather than by surface floodings. Therefore, this indicator should not be evaluated against the absolute frequency of floodings, but against the frequency and rhythm of floodings which are "normal" for a given plant community. This indicator should be treated as cardinal. For assessing the conservation status of an area as satisfactory, it should be required that at least 75% of sites have a satisfactory conservation status.
The age of tree stands	This indicator expresses the "maturity" of the phytocoenosis, measured, in a simplified way, with the age of trees constituting a given stand. This indicator should have an auxiliary character. For assessing the conservation status of an area as satisfactory, it should be required that at least 25% of sites have a satisfactory conservation status. At sites identified as subtypes 91E0-6 and 91E0-7, it is an auxiliary indicator, i.e. it should be evaluated, but without being taken into account in the evaluation of the parameter "specific structure and functions"
Vertical structure of the vegetation	An assessment should be "satisfactory" when the stand has a multi-generational structure, i.e. it is diverse in terms of age of particular trees. The assessment should be downgraded if the age structure of the tree stand is not diverse enough. Note: a layer and spatial structure of the tree stand (evaluated jointly) would probably be a more appropriate indicator (than merely a vertical structure). This indicator should have an auxiliary character. For assessing the conservation status of an area as satisfactory, it should be required that at least 50% of sites have a satisfactory conservation status.
Natural renewal of the tree stand	This indicator takes into account the total rate of renewal of all tree species that occur naturally in the tree stand. This indicator should have an auxiliary character. Non-renewal can be only temporary and should not automatically lead to a lower assessment of the "conservation status of the structure and functions". For assessing the conservation status of an area as satisfactory, it should be required that at least 25% of sites have a satisfactory conservation status.
Damage to the undergrowth and soil as a result of wood harvesting	It should be checked whether wood is harvested or not and if there are any tree stumps. Do the undergrowth and the surface of the soil exhibit any signs of damage? Young trees, the underbrush and stocks of deadwood, etc. should be checked too. The indicator should have an auxiliary character, i.e. it should not automatically lead to a lower assessment of the "specific structure and functions". For assessing the conservation status of an area as satisfactory, it should be required that at least 75% of sites have a satisfactory conservation status.
Other distortions	E.g.: damage caused by vehicles and pedestrians, contamination with litter. This indicator should have an auxiliary character. For assessing the conservation status of an area as satisfactory, it should be required that at least 90% of sites have a satisfactory conservation status.
The condition of locally typical species which are of key importance for the biodiversity of the habitat (optional indicator, to be used only when appropriate data are available)	An optional indicator for evaluating an additional aspect of the conservation status of a habitat – its ability to sustain locally typical species which are important for its biodiversity (protected, endangered, rare species). The selection of species that are to be taken into account will depend on the specific characteristics of the local area. Such species may include, for example: white-backed woodpecker Dendrocopos leucotos, collared flycatcher Ficedula albicolis, middle spotted woodpecker Dendrocopos medium, beetles from the Cucujidaes family, scarab beetle Protaetia aeruginosa, lesser stag beetle Dorcus parallelipipedus, hermit beetle Osmoderma spp., scarce fritillary Euphydryas maturna and other species. This indicator should only be used when appropriate data are available.

Parameter Indicator	Description
Conservation prospects	Evaluating "future conservation prospects of the habitat", attention should be paid to the following issues: • are patches of the habitat formally regarded as a "forest" or an "afforested area" and under whose management? • is there a risk that riparian forests will be cut down, e.g. as an anti-flood measure? • in the case when the riparian forest is formally regarded as a "forest", how is it managed and what provisions does the forest management plan contain with respect to particular patches of the habitat? • in areas where nature inventorying has been performed (including State Forests), it should be checked if the habitat has been identified correctly – it may be important for its protection in future. Any plans of possible hydro-technical investments are also very important for assessing the future conservation prospects of the habitat.

Table 2 Assessment of parameters of the conservation status and the indicators of its specific structure and functions of the natural habitat 91E0 - willow, poplar, alder and ash riparian forests

Parameter Indicator	Favourable FV	Unsatisfactory U1	Bad U2
Area of the habitat at the site	Is not decreasing, is not anthropogenically fragmented	Is showing a slow downward trend (decreases caused by deliberate reforestation of peat bogs should not be taken into account!) or is anthropogenically fragmented	Is showing a fast downward trend (decreases caused by deliberate reforestation of peat bogs should not be taken into account!) or is strongly anthropogenically fragmented
Specific structure and functions			
Characteristic species	The flora combination typical for a riparian forest	The flora combination is impoverished but based on species typical for a riparian forest	The flora combination is dominated not by riparian forest species but by meadow or ruderal species
Dominant species	all layers are dominated by species typical for the habitat and quantitative relations between them are natural (with no domination at the facies-level)	all layers are dominated by species typical for the habitat but quantitative relations between them are disrupted (domination at the facies-level)	one or more layers are dominated by a species which is alien for the natural plant community
Geographically alien species in the tree stand	<1% and not renewing themselves	<10% and not renewing themselves	>10% or spontaneously renewing themselves, irrespective of their proportion
Invasive alien species in the underbrush and forest floor vegetation	no more than 1 species present, not numerous-sporadic	more than 1 species or even 1 numerous species	domination of an alien species at the facies-level
Native expansive species of herbaceous plants	Not very strongly expansive	Strongly expansive but without limiting the diversity of the undergrowth	Dominating at the facies-level in a way which limits the diversity of the undergrowth
Native expansive species of herbaceous plants	Not very strongly expansive	Strongly expansive but without limiting the diversity of the undergrowth	Dominating at the facies-level in a way which limits the diversity of the undergrowth
Deadwood	>20m^3/ha	10-20 m^3/ha	<10 m^3/ha
Large-size deadwood	>5 pcs/ha	3-5 pcs/ha	<3 pcs/ha
Naturalness of the river-bed	The water course is not regulated or it has been restored to its natural state after previous regulation;	The water course has been regulated using "soft" methods, with its hydro-morphological features having been preserved	Regulation changing the rhythm of floodings or regulation completely changing the line of the water course. Existence of damming devices which change the water-course regime

Parameter Indicator	**Favourable** **FV**	**Unsatisfactory** **U1**	**Bad** **U2**
Water regime (including the rhythm of floodings, if exists)	The dynamics of floodings and over-saturation of the stratum with water is normal from the point of view of a given ecosystem / plant community	The dynamics of floodings and over-saturation of the stratum with water is below normal	There are no floodings or the stratum is completely dry
The age of tree stands	trees older than 100 years account for >20% of the total volume of trees	trees older than 100 years account for <20% of the total volume of trees, but trees older than 50 years account for >50% of the total volume of trees	trees older than 100 years account for <20% of the total volume of trees, whereas trees older than 50 years account for <50% of the total volume of trees
Vertical structure of the vegetation	natural, varied	changed anthropogenically, but varied	anthropogenically unified
Natural renewal of the tree stand	Yes, abundant	Yes, on an individual basis	None
Damage to the undergrowth and soil as a result of wood harvesting	None	Few traces, with <1% of the area/of the number of trees having been damaged	Considerable, affecting >1% of the area, of the number of trees, etc.
Other distortions	None	Occurring but insignificant	Strong
The condition of locally typical species which are of key importance for the biodiversity of the habitat (optional indicator, to be used only when appropriate data are available)	All such species evaluated as being in a satisfactory (FV) condition	Some species evaluated as being in an unsatisfactory (U1) condition	Some of such species evaluated as being in a bad (U2) condition
General structure and functions	All cardinal indicators evaluated as FV, other indicators evaluated at least as U1	All cardinal indicators evaluated at least as U1	One or more cardinal indicators evaluated as U2
Conservation prospects	There are no risks or negative trends. It is almost certain that the habitat will be preserved in a non-deteriorated condition for 10-20 years.	Preservation of the habitat in a non-deteriorated condition in the next 10-20 years is not certain, but it is likely, as long as the existing risks can be eliminated.	Preservation of the habitat in a non-deteriorated condition in the next 10-20 years is very difficult: advanced recession processes, strong negative trends or considerable risks.
Overall assessment	**All parameters evaluated as FV**	**One or more parameters evaluated as U1, no U2**	**One or more parameters evaluated as U2**

Cardinal indicators:

- characteristic species
- dominant species
- alien invasive species
- deadwood
- large-size deadwood
- water regime

3. An example of a filled-in habitat observation sheet for a monitored location

Habitat observation sheet for the monitored location	
Monitored location – basic information	
Code and name of the natural habitat	91EO willow, poplar and alder riparian forests
91EO-S submontane ash riparian forest	
Site name	Tomasówka Górna
Site type	Research
Plant communities	It is difficult to unambiguously classify this habitat as one of the plant communities which have thus far been identified in the Sudetes. On the one hand, it has many features of a submontane ash riparian forest Carici remotae-Fraxinetum. On the other hand, its species composition is somewhat similar to communities from the Tilio-Acerion alliance, especially to adjacent Mercuriali-Fraxinetum communities.
Description of the habitat at the monitored location	Ash and sycamore forest in the upstream part of the Tomaszówka stream (Tomaszewski Stream). It develops as a narrow strip on a very stony stratum along the banks of a river. It is adjacent to grasslands and spruce monocultures planted on the steep slopes of the valley, formerly occupied by Tilio-Acerion forests of slopes, screes and ravines.
The area of habitat patches	0.25-0.3 ha
Natura 2000 site	PLH020019 Krowiarki Range
Other protected areas where the site is located	None
Manager of the area	State Forests, Forest District of Tomaszówka
Geographical coordinates	N 50"16' ... "; E 16°48' ..."
Dimensions of the transect	10 x 200 m
Altitude above sea level	595 – 61O m
Annual report – basic information	
Year	2008
Monitoring type	Detailed
Coordinator	Jan Kowalski
Additional coordinators	
Threats	Planned forest management, penetration of alien species due to a large contact area, dieback of ash trees due to insect plagues
Other natural values	No data
Is monitoring required?	Yes
Justification	The habitat has an unusual flora composition (species characteristic for 91 EO and 9180). It is advisable to monitor the dynamic tendencies of the habitat.
Protective measures taken	No
Proposed protective measures	Exclusion from forest management as a water- and soil-protection forest continuous scientific monitoring
Date of monitoring	22.07.2008
Comments	-

Habitat observation sheet for the monitored location	
Conservation status of the natural habitat at the monitored location	
Phytosociological relevé I	
Geographical coordinates of the centre, elevation a.s.l., Area of the relevé, inclination, exposure Density of layers a, b, c, d Height of layers a, b, c, d Phytosociological unit	Coordinates: N 50"16' ... "; E 16°48' ... ", 595 m a.s.l. Area of the relevé: 100 m^2, Inclination and exposition: none Density of layers: A – 55%, B – 20%, C – 80% Height of layers: A - 20 m, B - 4 m, C - 0.8 m Species: layer a: Acer pseudoplatanus 2, Fraxinus excelsior 3; layer b: Acer pseudoplatanus l, Corylus avellana 2, Lonicera xylosteum l, Rosa pendulina 2; layer c: Acer platanoides r, Aegopodium podagraria 2, Asarum europaeum 2, Athyrium iilix-femina +, Carex sylvatica r, Chaerophyllum hirsutum l, Chrysos- plenium alternifolium +, Corylus avellana +, Crepis paludosa +, Deschampsia caespitosa r, Dryopteris carthusiana r, Dryopteris filix-mas 1, Epilobium montanum -ł-, Filipendula ulmaria r, Fraxinus excelsior l, Geleobdolon luteum 2, Galium aparine +, Geranium robertianum l, Impatiens noli-tangere 2, Impatiens parviflora l, Mycelis muralis r, Oxalis acetosella 2, Paris quadrifolia +, Petasites albus +, Picea abies r, Poa trivialis l, Polygonatum verticil- latum +, Ranunculus lanuginosus l, Ribes uva-crispa +, Rubus idaeus +, Senecio nemorensis 2, Stellaria nemorum 2, Thalictrum aquilegiifolium +, Urtica dioica +, Veratrum lobelianum r
Phytosociological relevé II	
Geographical coordinates of the centre, elevation a.s.l., Area of the relevé, inclination, exposure Density of layers a, b, c, d Height of layers a, b, c, d Phytosociological unit	Coordinates: N 50"16' ... "; E 16°48' ... ", 600 m a.s.l. Area of the relevé: 100 m^2, Inclination: 0, Exposure: 0 Density of layers: A – 65%, B – 55%, C – 85% Species: layer a: Acer pseudoplatanus 2, Fraxinus excelsior 4; layer b: Acer pseudoplatanus, Corylus avellana 3, Rosa pendulina 3, Ulmus glabra r; layer c: Acer platanoides +, Acer pseudoplatanus + Entoloma pleopodium;a 2, Asarum europaeum 2, Athyrium filix-femma l, Campanula trachelium +, Chaerophyllum hirsutum l, Chrysosplenium alternifolium +, Cirsium oleraceum +, Crepis paludosa r, Deschampsia caespitosa +, Dryopteris filix-mas l, Filipendula ulmaria +, Galeobdolon luteum 2, Galium aparine +, Impatiens noli-tangere l, Lonicera xylosteum +, Mercurialis perennis 2, Mycelis muralis +, Oxalis acetosella l, Paris Juadrifolia r, Petasites albus 2, Phyteuma spicatum +, Poa nemoralis +, Poa remota +, Ranunculus anuginosus l, Ribes uva-crispa l, Senecio nemorensis 2, Stellaria nemorum l, Thalictrum aquilegiifolium +, Ulmus glabra +, Urtica dioica +, Veratrum lobelianum 1
Phytosociological relevé III	
Geographical coordinates of the centre, elevation a.s.l., Area of the relevé, inclination, exposure Density of layers a, b, c, d Height of layers a, b, c, d Phytosociological unit	Coordinates: N 50"16' ... "; E 16°48' ... ", 610 m a.s.l. Area of the relevé: 100 m^2, Inclination: 10°, Exposure: E Density of layers: A – 55%, B – 45%, C – 85%, Species: layer a: Acer pseudoplatanus 3, Fraxinus excelsior 3, Picea abies 1; layer b: Acer pseudoplatanus 2, Corylus avellana 2, Rosa pendulina 3; layer c: Acer pseudoplatanus 1, Aegopodium podagraria 2, Asarum europaeum 2, Carex sylvatica +, Chrysosplenium alternifolium +, Cirsium oleraceum r, Deschampsia caespitosa r, Dryopteris carthusiana +, Dryopteris filix-mas 1, Epilobium montanum r, Euphorbia dulcis +, Fraxinus excelsior 1, Galeobdolon luteum 2, Galium aparine +, Geum urbanum 1, Heracleum sphondylium r, Impatiens noli-tangere 1, Impatiens parviflora 1, Maianthemum bifolium r, Oxalis acetosella 2, Paris quadrifolia +, Petasites albus 2, Poa remota +, Polygonatum verticillatum 1, Primule elatior r, Ranunculus lanuginosus +, Ribes uva-crispa +, Rubus idaeus 1, Senecio fuchsii 2, Sorbus aucuparia +, Stellaria nemorum 1, Thalictrum aquilegiifolium 2, Urtica dioica 1, Viola reichenbachiana +

TRANSECT			
Parameters Indicators	**Description of the indicator**	**Value of the parameter/ indicator**	**Evaluation of the parameter/ indicator**
Surface area of the habitat		0.25-0.3 ha Limited fragmentation with spruce tree plantations	U1
Specific structure and functions			U1
Characteristic species	List of characteristic species (Polish and Latin name); specify the proportion of the area covered by each species on the transect (with accuracy of up to 10)	Stellaria nemorum 3-5 Petasites albus 15-20 Crepis paludosa <1 Aegopodium podagraria 5-10 Urtica dioica 1 Galium aparine <1 Thalictrum aquilegifolium 1 Chaerophyllum hirsutum 1. The number of characteristic undergrowth species and the areas covered by them relatively low in comparison with typical patches of Carici remotae-Fraxinetum. In addition, there are no typical swampy species which constitute a permanent component of boggy patches of the submontane ash riparian forest in the Sudetes such as Carex remota, Gyceria spp., Veronica beccabunga, vetonice montana	U1
Dominant species	A list of dominant species on the transect (Polish and Latin name); specify the proportion of the area covered by each species on the transect (with accuracy of up to 10); specify only species with coverage of 2:10	a: Acer pseudoplatanus 15-20, Fraxinus excelsior 45-50; b: Corylus avellana 20-30, Rosa pendulina 20-30; c: Asarum europaeum 15-20, Petasites albus 15-20, Mercurialis perennis 15-20	FV
Geographically alien species	A list and percentage of geographically alien species	None	FV
Alien invasive species in the undergrowth and underbrush	A list of invasive and geographically alien species (Polish and Latin name); specify the proportion of the area covered by each species on the transect (with an accuracy of up to 10%)	Invasive: Impatiens parviflora <1 Other: none	FV
Expansive native species (apophytes)	A list of species (Polish and Latin name); specify the proportion of the area covered by each species on the transect (with an accuracy of up to 10 %	The dynamic tendencies of undergrowth species are hard to establish	XX
Deadwood	Visual estimation of the quantity of deadwood in comparison with live wood. Description of elements of existing deadwood and of its species.	About 5 different thicknesses of live wood Dead trees, standing and lying, mainly spruce, branches of deciduous trees.	U1
Large-size deadwood	Estimation of the number of such fragments on 1 ha	Approximately 3 pcs on 1 ha	U1

The naturalness of the river bed (to be used only in the case when the development of the riparian forest is connected with a water course)	Description	No signs of regulation	FV
Water regime (including the rhythm of floodings if they occur)	Description	Normal, there are no anthropogenic distortions of the water regime	
Age structure of tree stands	Trees of the same age, proportion of trees > 100 years; proportion of trees >50 years	Tree stands of different age, but without old trees. The number of trees > 100 years: 0. The number of trees >50 years: 60.	U1
Vertical vegetation	Description	Natural, diverse	FV
Natural renewal of tree stands	The proportion of transect coverage by natural renewal (if there are different species, specify the proportion for every species)	Acer pseudoplatanus <1 Fraxinus excelsior 1-2	FV
Damage to the undergrowth and soil caused by picking forest fruit	Describe and evaluate the intensity	Damage to the undergrowth as a result of log-rolling	U1
Other distortions	Description	None	U1
The condition of locally typical species that are of key importance for the biodiversity of the habitat (optional indicator, to be used only when appropriate data are available)	List of species and description of their conservation status.	No data	XX
Conservation prospects		As envisaged in the forest management plan, the tree stand is to be covered by forest management activities. There are no plans to interfere with the water course. Natural processes should gradually restore the naturalness of the structure.	FV
Overall assessment The percentage share of areas representing different conservation status in the entire area of the monitored location (in comparison with the total habitat area in that location) shall also be provided		FV -	U1
		U1 100%	
		U2 -	

Human activities				
Code	**Name of activity**	**Intensity**	**Impact**	**Description**
160	Forest management	B	-	Habitat fragmentation by cultivation and maintenance of spruce tree plantations on a part of the potential patch of the habitat

4. Habitats of similar ecological characteristics

Most methodology components (in particular the indicators relating to the structure and functions) can be adapted for the purpose of monitoring other forest natural habitats. However, the indicators specific for riparian forests – associated with the water course accompanying them and water conditions (including river water floodings), will not be applicable then.

5. Protection of the habitat

The key to the protection of riparian forests is the preservation of natural water conditions in which these ecosystems have developed. Different subtypes of the habitat differ with their flooding regime – the aim of protection measures is to preserve or recreate the regime in which the relevant community has developed. The postulate to restore the naturalness of proper water relations for riparian forests tends to be purely theoretical, because there are no examples of natural protection projects known to have put this postulate into effect.

The construction of small retention dams on artificial ditches may improve the condition of riparian forest habitats. The conservation status of riparian forests may also improve, in an indirect way, if the water courses associated with them regain their natural character.

In most cases, passive protection is the best method of protecting riparian forests, provided that there are proper water conditions. It is the most effective method of optimizing the condition of the natural habitat and enhancing its role in the protection of biodiversity.

Riparian forests can function successfully without human assistance and are in the best condition when they are not put to any use. And this is often the case – in many forest districts, small patches of riparian forests are left unused and are not subjected to any forest management activities. In some patches of riparian forests outside State-owned forests, wood is harvested in an unplanned fashion – trees are plundered and cut illegally by local residents or entire patches of riparian forests are cleared within the framework of anti-flood measures. The scale of this phenomenon is sometimes larger than that of the forest cutting performed as part of planned forest management activities in forest districts.

Sustainable and planned forest management in riparian forests is acceptable, as long as it does not have a major negative impact on the state of the natural habitat and on condition that clear cutting is ruled out and only partial cutting or gradual cutting is allowed there, and on further condition that no ecologically and geographically alien tree species are introduced and that there is no decrease – even temporary – in the proportion of old trees, fragments of tree stands and stocks of deadwood. The reversion of riparian forests to their natural state usually consists in “making them older” and restoring the stocks of dead and decomposing wood. These elements have a key significance for anthrophobic species which are an essential element of the biodiversity associated with riparian forests.

It should be emphasized, however, that in the case when riparian forests and brushwood occur in small patches over water courses – it is vitally important to reduce forest management activities.

Riparian forests containing a proportion of ash trees have recently been affected by ash dieback, occurring all over Poland. An effective method of preventing ash dieback has not been found yet. There is no evidence that the removal of dying ash trees slows down the progression of that disease, although of course it seems rational from the point of view of the utilization of wood raw material.

Active protection measures, such as eradication of invasive alien species, may need to be taken in patches of riparian forests invaded by neophytes – and habitat 91E0 is highly susceptible to such invasions and strongly endangered by them. Thus far, there have been no examples of effective eradication of invasive alien species from riparian forests.

The protection of riparian forests should focus on the maintenance or restoration of the natural water regime – and on this basis, a rational compromise should be achieved between the optimum passive protection of the ecosystem and the needs associated with its economic use. Such a

compromise can be attained by excluding from use a certain part of riparian forests in the area and "giving it back to nature".

It is suggested that the following rules should be adopted:

- The most valuable and best-preserved natural habitats should be excluded from use and protected as "reference areas" or, possibly, they should be protected as nature reserves. Such an example of "riparian forests developing naturally", with an area of at least approximately 30-50 ha, should gradually be established in every forest district.
- Forest use involving clear cutting should not be allowed (I).
- In other patches, a complex system of cutting may be introduced; however, more care should be taken to maintain and restore stocks of decomposing wood and to preserve fragments of old tree stands in their original state. In every clearfelling, 5% of the tree stand (in the form of a compact fragment) should be left as a future generation, with an area of no less than 0.5 ha. Dying and dead trees should be left to ensure stocks of decomposing wood equal to at least 10% of mature tree stands. Old birch, aspen, alder and hornbeam trees should not be removed ("bird hollow" species).
- Clear cutting should be planned in such a way so as to prevent any negative impact on the "conservation status structure" of riparian forests in the entire forest district. It must be made sure that the proportion of tree stands which are more than 100 years old is not reduced.
- If there are ash, elm and oak trees in the forest stand, it should be made sure that these species are also present in forest renewals.
- Species of alien origin (e.g. Canadian poplar) should be eliminated. It also relates to the layer of bushes.
- Areas which turn into a swamp due to natural causes should be tolerated. The activity of beavers should be tolerated, too.
- In the case of spring riparian forests, it is necessary to exclude them from use. In addition, no clear cutting should be performed in adjacent tree stands within a distance 2 times longer than the height of the stand from the edge of the spring riparian forest.

The needs associated with the conservation of riparian forests must be taken into account in flood prevention plans.

Natural disruptions (flood damage, erosion caused by a river, activity of beavers) should not be assessed as something negative from the point of view of the conservation status of riparian forests, even when they cause local damage to tree stands or phytocoenoses. Usually, they do not require any countermeasures.

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