EUROPE / NORTH AMERICA

BIALOWIEZA FOREST
(Extension and renomination of “Belovezhskaya Pushcha / Białowieża Forest”, Belarus/Poland”)

POLAND / BELARUS
Background note: The Bialowieza National Park (Poland) was inscribed on the World Heritage list in 1979 (Decision 03COM XII.46). In 1992 the Committee inscribed Belovezhskaya Pushcha State National Park (Belarus) as an extension of the Bialowieza National Park of Poland (Decision 16Com X.A), and renamed the property Belovezhskaya Pushcha / Białowieża Forest. In 1999 the Committee commended the State Party of Poland for their initiative to expand the property but decided not to include the proposed extension into the existing World Heritage site, noting that the proposed extension would provide an important contribution to the biodiversity of the Polish part, in particular, through oligotrophic pinewoods, but would not be significant for the World Heritage property as a whole (Decision 23COM VIII.A.2). In several decisions the Committee requested the States Parties to create a joint management structure for the whole World Heritage property and improve transboundary cooperation (e.g. Decisions 28COM 15B.20 and 31COM 7B.30). Furthermore, in 2006, the Committee encouraged the States parties to explore the possibilities of extending the whole transboundary World Heritage property (Decision 30COM 7B.20).

1. DOCUMENTATION

a) Date nomination received by IUCN: 20 March 2013

b) Additional information officially requested from and provided by the State Party: Following the technical evaluation mission the States Parties were requested to provide supplementary information on 13 December 2013. The information was received on 25 February 2014.


d) Consultations: 11 desk reviews received. The mission also met with representatives from the National Park „Białowieża Forest”; from NGOs; from BNP; from the Polish Ministry of the Environment; the Belarus Ministry of Natural Resources and Nature Conservation; from the Regional Directorate of the Protection of the Environment; the Director and Vice Director of General Directorate of State Forest Administration; and many other stakeholders.

e) Field Visit: Pierre Galland and Elena Osipova, 19-24 September 2013

f) Date of IUCN approval of this report: March 2014

2. SUMMARY OF NATURAL VALUES

The Bialowieza Forest (BF) is a large forest complex located on the border between Poland and Belarus.

The existing transboundary World Heritage property at present comprises an area of 92,669 ha, 5,069 ha of which is located in Poland and the remaining area in Belarus. The present nomination proposes a significant modification of the boundaries, resulting in a 5,291 ha decrease of the Belarusian part, in much better configured boundaries, and including a large extension of the Polish part of the property from 5,069 ha to 59,576.09 ha. New buffer zones are also proposed with
an area of 130,873.4 ha in Belarus, and an area of 35,834.91 ha in Poland. The extended transboundary property would have a significantly larger total area of 141,885 and a new buffer zone of 166,708.

The States Parties also propose a new simplified name for the property: Bialowieza Forest.

BF is located in the boreo-nemoral biogeographical region and is situated in the transition area between continental and sub-boreal climate zones. Some Atlantic climate elements are perceptible here as well. BF is located in the transition zone of the European lowland deciduous forests and the Eurasian coniferous forests, and protects a diversity of natural forest types and associated ecosystems. The nominated property includes a large area with substantially undisturbed natural vegetation that mainly includes old-aged deciduous and coniferous forests. The forest vegetation in BF is dominated by fresh oak-linden-hornbeam forest. The second most significant forest communities are ash-alder flood plain forests, and bog-birch forest (Thelypterido-Betuletum pubescentis). Other forest communities are thermophilous oak-hornbeam forest, thermophilous pine-spruce forest and mosaics of humid pine forest. Non-forest ecosystems include natural bog areas. The boggy ecosystem structure includes lowland hollow bogs with the prevailing gramineous/sedge and mixed herb/sedge associations. The large Dikoye bog occupies the north-eastern part of the nominated property. In addition wet meadows contribute to the biodiversity values.

The different types of forest and communities are inseparably linked within the overall ecosystem of the nominated property. An important aspect of the Bialowieza Forest – especially for the big mammals – is the overall size of the largely undisturbed forest. The nominated property’s naturalness and long history of lack of exploitation, manifested in the mature structure of the ecosystem, and extensive presence of old trees and dead wood are also key features. Non-forest communities, situated mainly in the river valleys, are extremely important contributors to overall biodiversity. Insects such as butterflies and dragonflies occur there. A gradient of different habitat types may be observed across the river valleys. The property is exceptional at the European scale with regard to its undisturbed forest and associated ecosystems.

In terms of flora, there are no endemic species in the BF. There are, however, relicts of times when different climatic conditions dominated. There are over 1,060 vascular plant species and an estimate of over 400 lichen species. Recent data confirms over 230 bryophyte species, 71 liverworts and 2 antocerotes. Waterbodies and watercourses support all main groups of phytoplankton and are characterized by high taxonomic diversity (over 200 species). The phytoperiphyton community includes 250 species.

In terms of mycoflora, BF can be considered one of the most important refuges for large-cap fungi (macromycete) in the whole boreo-nemoral region. Just in a small area of 10,000 ha, over 1,600 macromycete species were listed. Out of 33 macromycete species regarded as critically endangered in Europe, at least 5 occur in the BF.

The property supports 59 mammal species, including the iconic symbol of the BF: the European bison. There are approximately 900 individuals, representing 25% of the total global population and over 30% of free-living animals. These are a reintroduced population. In 1919 the last European bison in the BF was killed by poachers. Ten years later, a breeding program was set up to conserve the species and to bring it back into the wild. In 1952 the first two individuals were released into forest and two years later the group of 16 bison was reintroduced. Other mammals present include roe deer, red deer, elk and the wild boar, and are preyed on by the grey wolf and lynx. Smaller predators like otter, weasel, marten and their relatives, are also abundant. Many small mammals: shrews, voles, mice, dormice, other rodents and insectivores, also have their home in the forest.

254 bird species have been recorded in the Bialowieza Forest to date and 170-180 of them nest in the property. The property is especially abundant in raptor birds (15 species), owls (8 species), woodpeckers (9 species) and leaf-warblers (23 species). Notable breeding bird species in the BF include white backed woodpecker, three-toed woodpecker, short-toed eagle, booted eagle, lesser spotted eagle, Eurasian pygmy owl, great grey owl, and the Eurasian eagle-owl.

BF is home to 7 reptile species among which the most rare and charismatic is the European pond tortoise Emys orbicularis. The most common species are Natrix natrix, Anguis fragilis and Zootoca vivipara. There are 13 amphibian species in the BF. And according to the existing data there are 31 fish species representing 11 families.

There are over 12,000 invertebrate species recorded from the BF, but it is estimated that the actual total may be up to 20,000. Each year new species are described from the nominated property. The nomination lists 70 species new to science described since the 1960s, including algae, mycota, protista, nematodes and flies. The old-growth forests are home to a diversity of saproxylic species (species associated to dead wood), which require large and old (over two-hundred-year) trees and undisturbed conditions to survive.

IUCN also notes that the renomination also includes a significant extension and consolidation of boundaries of the existing property. The new boundaries include all the most significant areas of old-growth forest, which ensures that the most valuable areas of Bialowieza Forest are included in property. These include important areas used by key species in the property, including the
European Bison. Thus the extension reinforces the integrity of the property, and recognition of attributes important for the application of both criterion (ix), in terms of the extent of forest ecosystems of high conservation value, and criterion (x), notably in terms of species associated with these old-growth areas.

3. COMPARISONS WITH OTHER AREAS

The existing World Heritage property was amongst the very first inscriptions and dates from 1979. The recognition under current criterion (vii) (but note the amendments to criteria over time) has been a constant source of comment, and is considered to reflect the interpretation and use of this criterion that prevailed in the early years of the Convention. However IUCN agrees with the renominating States Parties that this criterion, in its current definition, does not apply to Bialowieza Forest and that biodiversity criteria should be more appropriately applied. In terms of the current application of the concept of natural beauty, the property, though recognized at the European level, does not have an Outstanding Universal Value, and nor does the bison population correspond to the natural phenomenon component of criterion (vii). As a renomination, the consideration of the application of the criteria needs to have regard to the existing status of the property on the World Heritage List, and the World Heritage Committee’s decision at the time of first inscription.

The existing World Heritage site Belovezhskaya Pushcha / Białowieża Forest is the only existing World Heritage site in the Boreo-nemoral Udvardy province and in the Central European mixed forests terrestrial ecoregion. The existing forest ecosystem of primeval character justifies the application of criterion (ix). This complex of forests is unique due to its high conservation status with old growth forests almost undisturbed in the core zone. A large section has been almost completely preserved from exploitation and natural processes are on-going. The consequence is the richness in dead wood, standing and on the ground, and consequently a high diversity of fungi and saproxylic invertebrates. The nominated property displays an exceptionally well conserved and large forest area with a significant buffer zone. The long tradition of research on undisturbed lowland forest ecosystem and the numerous publications, including description of new species, also contributes to the values of the nominated property.

Due to its size and conservation status as an old growth forest with large amount of standing and fallen dead wood, the nominated property is particularly rich in birds, saproxylic insects and fungi. Several new species have been described here and many threatened species are still well represented. The property is home to the largest free-roaming population of European Bison.

IUCN’s recent thematic study on Terrestrial Biodiversity and the World Heritage List, notes the existing property as amongst the 7 most irreplaceable natural World Heritage properties that are not already recognized for their biodiversity, and within the 1,000 most irreplaceable protected areas for biodiversity. These findings also support the application of criteria (ix) and (x) to reflect the existing inscription of the property on the World Heritage List. The significant extension of the existing property also reinforces the application of both criteria through adding new areas of forest ecosystems, and increased function in the protection of threatened species.

4. INTEGRITY, PROTECTION AND MANAGEMENT

4.1 Protection

There are effective legal protection measures in place for the property, but the distribution of management responsibilities in Poland, between the National Park and the Forest Administration, is a potential major constraint in achieving the integrated management of the property. In order to effectively address this situation, the State Party of Poland has developed and signed (October 2013) an agreement establishing a Steering Committee between these two administrations. The situation is simpler in Belarus; the whole property is managed by the National Park Authority, which is directly under the President’s cabinet. Practically the whole of the nominated property area is state-owned, both in Poland and in Belarus. The relationship with local land owners in the park (very few) and around it seems to be good.

IUCN considers the nominated property meets the protection requirements of the Operational Guidelines.

4.2 Boundaries

The nominated extension is a significant addition to the integrity of the existing inscribed property. As per the background note, many past analyses by the Committee, as well as in other studies, have underlined the recommendation to include the forests surrounding the National Park in Poland and to ensure their effective management and conservation. On the Belarus side major efforts have been made to establish more coherent boundaries for protection and consistent management measures.

The new boundaries appear to be appropriate, and result in an increase in the integrity of the property; they cover about 80% of the total forest areas of the Bialowieza region, including all the most valuable old growth forests. In addition, the new boundaries are more coherent than the previous ones, particularly in Belarus, facilitating effective management.

Land zonation in relation to the management of the property and adjacent landscape seems adequate, and is achieved through the establishment of a large buffer zone. In Poland the boundaries of the proposed buffer
zone follow the borders of the Zone II of the Bialowieza Biosphere Reserve. In Belarus the buffer zone boundaries also largely follow the boundaries of the Belovezhskaya Pushcha Biosphere Reserve. It will be essential that the ongoing management ensures a clear understanding of the function of the World Heritage property buffer zone, Biosphere Reserve buffer zone and National Park buffer zone, and coherence and simplification of these is needed.

Due to the large size of the nominated property and its isolation within the surrounding agriculture zones, wider connectivity with other natural areas is an issue.

One important issue to note is the presence of high barbed wire fences along the national border. This obstacle prevents exchanges of large mammals between Poland and Belarus; however IUCN notes that there is an active discussion on the benefits to the management of genetic diversity in the bison populations in Poland and Belarus through maintaining the fence. IUCN considers it is essential that the two States Parties monitor the impacts of the border fence and consider the options to improve connectivity within the property, and to facilitate wildlife movement.

IUCN considers the boundaries of the nominated property meet the requirements of the Operational Guidelines.

4.3 Management

All bodies responsible for the management of the property (Bialowieza National Park and Forest Administration in Poland, and Belovezhskaya Pushcha in Belarus) appear to be relatively well-resourced in terms of human and financial resources. On both sides there are large teams including scientists, managers, communication officers, etc. In Belarus the Belovezhskaya Pushcha National Park is considered a high priority area and it receives significant budget allocations from the government; its budget appears secure in the long-term. In Poland the Forest Administration appears to have a significant budget secured by its commercial activities; however there is a need to clarify the additional budget that will be allocated for the management of the proposed extended property.

A management plan for the National Park exists in Belarus, but was not provided with the nomination dossier. The plan was submitted in February 2014 as supplementary information. In Poland all forest areas have forestry management plans and there is also a legal requirement to develop and implement management plans for protected areas. The new Management Plan for the Bialowieza National Park in Poland has not yet been approved, but it is expected that it will be finalized and officially adopted in 2014. In addition the field mission noted that the protection regime for forests outside of the National Park in Poland needs to ensure an integrated management plan for the whole nominated property. IUCN notes that the Council of Europe Diploma held by BNP is currently suspended due to the lack of approval of the management plan.

The IUCN field mission also noted there is no single joint management structure in place and it is not clear whether the Joint Management Framework, the text of which was provided during the mission, had been formally adopted.

In February 2014 the State Parties submitted supplementary information, including copies of recently signed agreements: the Agreement between the Bialowieza National Park and the Forestry Administration in Poland on the establishment of a Steering Committee for the World Heritage property. The Bialowieza National Park, the Polish Forestry Administration and the Belovezhskaya Pushcha National Park have also very recently signed an agreement regarding preparation and implementation of the management plan for the nominated property. The agreement also mentions that within 60 days from February 11th 2014 an agreement on establishment of a transboundary steering committee will be prepared. The transboundary steering committee will then prepare a management for the whole transboundary property which will be presented to the World Heritage Committee.

Thus at present, in spite of the lack of a formal agreement, there seems to be good transboundary cooperation between the teams of the two national parks, as well as the Forest Administration. However, this cooperation needs to be officially institutionalized and the two recently signed agreements demonstrate the willingness of the involved organizations to move rapidly in this direction. The World Heritage Committee may wish to seek an update on the progress with the above, with the State of Conservation reporting process.

IUCN considers that the management of the property as currently listed does not meet the requirements of the Operational Guidelines, but with the actions to be undertaken and the timeframe proposed by the States Parties for implementation, as noted in the supplementary information to the nomination, the main deficiencies should be addressed.

4.4 Community

Coordinated governance and joint management is still at an embryonic state, though the preparation together of the nomination dossier has been a major step to increase the involvement and support from local communities in the management of the property.

NGOs and other partners met during the mission expressed consistent support for the renomination and extension, which is a long-awaited proposal and they see as an opportunity to strengthen the conservation of the property. They noted the importance that the corresponding management measures required for the
extended property are definitively adopted and effectively implemented and enforced.

4.5 Threats

The nominated property is effectively protected, and whilst some areas of forest have been exploited in the past, most of these areas are recovering through natural succession. Non-forest areas have been maintained through active management in the past, including through grass and reed cutting. This will be continued; it also provides winter food for the bison, and assists in managing grazing damage and thus contributes to forest recovery. It also keeps open habitats for several important bird species.

There are a range of roads in the property, and some are still maintained without any obvious justification. Forest fire is a potential threat, though only very limited fires happened in the last few years. Climate change might affect the forest ecosystem distribution in future and also may increase the danger of forest fires. Miles of fire prevention corridors are also maintained inside the property. IUCN recommends that the States Parties carefully assess the real need for maintaining these roads and fire prevention corridors, and reduce their numbers through a programme of rationalization, accompanied by appropriate monitoring. As noted above, the function of the border fence and its impacts on connectivity also require continued monitoring.

Tourism development does not appear to be a threat, due to the size of the property and the good protection of its core values (old forest stands).

Overall the most significant threat to the nominated property is the lack of an integrated management plan and risk of ineffective protection and management of the property. In the case of the State Party of Poland, there are divided responsibilities for management between the National Park and the Forest administration. Thus the action to address the weaknesses in the overall effective and integrated management of the property as a whole represents the most significant action required by the States Parties, in relation to the possible inscription of the extended property of Bialowieza Forest on the World Heritage List.

IUCN considers the property meets the expected conditions of integrity, but that action is needed, to be followed via the State of Conservation process, to ensure both the existing property and the extended area meet fully the protection and management requirements of the Operational Guidelines.

5. ADDITIONAL COMMENTS

None.

6. APPLICATION OF CRITERIA

Bialowieza Forest has been nominated under natural criteria (ix) and (x) as an extension of the existing Belovezhskaya Pushcha / Białowieża Forest, currently inscribed under criterion (vii).

Criterion (ix): Ecosystems/communities and ecological/biological processes

Bialowieza Forest conserves a diverse complex of protected forest ecosystems which exemplify the Central European mixed forests terrestrial ecoregion, and a range of associated non-forest habitats, including wet meadows, river valleys and other wetlands. The area has an exceptionally high nature conservation value, including extensive old-growth forests. The large and integral forest area supports complete food webs including viable populations of large mammals, large carnivores (wolf, lynx and otter) amongst other. The richness in dead wood, standing and on the ground, leads to a consequent high diversity of fungi and saproxylic invertebrates. The long tradition of research on the little disturbed forest ecosystem and the numerous publications, including description of new species, also contributes significantly to the values of the nominated property.

The existing property of Belovezhskaya Pushcha / Białowieża Forest is the only existing World Heritage site in the Boreo-nemoral Udvardy province and in the Central European mixed forests terrestrial ecoregion, and the proposed extension to the area adds both new attributes, and increases the integrity of the property.

IUCN considers that the nominated property meets this criterion.

Criterion (x): Biodiversity and threatened species

Bialowieza Forest is an irreplaceable area for biodiversity conservation, due in particular to its size, protection status, and substantially undisturbed nature. The property is home to the largest free-roaming population of European Bison, which is the iconic species of this property. However the biodiversity conservation values are extensive, and include protection for 59 mammal species, over 250 bird species, 13 amphibians, 7 reptiles, and over 12,000 invertebrates. The flora is diverse and regionally significant, and the property also is notable for conservation of fungi. Several new species have been described here and many threatened species are still well represented.

IUCN considers that the nominated property meets this criterion.

The existing World Heritage property was inscribed under criterion (vii). In recommending the support for the nomination under biodiversity criteria, IUCN also consider criterion (vii) does not apply to this nomination taking into account its current definition, and therefore
also agrees with the proposal by the States Parties to no longer apply criterion (vii) to the property.

7. **RECOMMENDATIONS**

IUCN recommends that the World Heritage Committee adopt the following draft decision:

The World Heritage Committee,

1. Having examined Documents WHC-14/38.COM/8B and WHC-14/38.COM/INF.8B2;

2. Approves the extension of **Bialowieza Forest (Poland, Belarus)** on the World Heritage List under natural criteria (ix) and (x).

3. Adopts the following Statement of Outstanding Universal Value:

**Brief synthesis**

Bialowieza Forest is a large forest complex located on the border between Poland and Belarus. Thanks to several ages of protection the Forest had survived in its natural state to this day. The Bialowieza National Park, Poland, was inscribed on the World Heritage List in 1979 and extended to include Belovezhskaya Pushcha, Belarus, in 1992. A large extension of the property in 2014 results in a property of 141,885 ha with a buffer zone of 166,708 ha.

This property includes a complex of lowland forests that are characteristics of the Central European mixed forests terrestrial ecoregion. The area has exceptionally conservation significance due to the scale of its old growth forests, which include extensive undisturbed areas where natural processes are on-going. A consequence is the richness in dead wood, standing and on the ground, and consequently a high diversity of fungi and saproxylic invertebrates. The property protects a diverse and rich wildlife of which 59 mammal species, over 250 bird, 13 amphibian, 7 reptile and over 12,000 invertebrate species. The iconic symbol of the property is the European Bison: approximately 900 individuals in the whole property which make almost 25% of the total world’s population and over 30% of free-living animals.

**Criteria**

**Criterion (ix)**

Bialowieza Forest conserves a diverse complex of protected forest ecosystems which exemplify the Central European mixed forests terrestrial ecoregion, and a range of associated non-forest habitats, including wet meadows, river valleys and other wetlands. The area has an exceptionally high nature conservation value, including extensive old-growth forests. The large and integral forest area supports complete food webs including viable populations of large mammals and large carnivores (wolf, lynx and otter) amongst other. The richness in dead wood, standing and on the ground, leads to a consequent high diversity of fungi and saproxylic invertebrates. The long tradition of research on the little disturbed forest ecosystem and the numerous publications, including description of new species, also contributes significantly to the values of the nominated property.

**Criterion (x)**

Bialowieza Forest is an irreplaceable area for biodiversity conservation, due in particular to its size, protection status, and substantially undisturbed nature. The property is home to the largest free-roaming population of European Bison, which is the iconic species of this property. However the biodiversity conservation values are extensive, and include protection for 59 mammal species, over 250 bird species, 13 amphibians, 7 reptiles, and over 12,000 invertebrates. The flora is diverse and regionally significant, and the property also is notable for conservation of fungi. Several new species have been described here and many threatened species are still well represented.

**Integrity**

The property is a large, coherent area conserved via a range of protective designations representing the full range of forest ecosystems of the region, and providing habitat for large mammals. The presence of extensive undisturbed areas is crucial to its nature conservation values. Some of the ecosystems represented in the property (wet meadows, wetlands, river corridors) require maintenance through active management, due to the decrease of water flow and absence of agriculture (hay cutting). The buffer zone that has been proposed by both State Parties appears sufficient to provide effective integrity of the property from threats from outside its boundaries. There are some connectivity challenges, from barriers inside the property, and its relative isolation within surrounding agricultural landscapes, that require continued management and monitoring.

**Protection and management requirements**

The property benefits from legal and institutional protection in both States Parties, through a variety of protected area designations.

Protection and management requires strong and effective cooperation between the States Parties, and also between institutions in each State Party. The Bialowieza National Park (Poland), the Polish Forestry Administration and the Belovezhskaya Pushcha National Park authorities have entered into an agreement regarding preparation and implementation of an integrated management plan for the nominated property, and to establish a transboundary steering group. In addition the State Party of Poland has developed an agreement establishing a Steering Committee between the National Park and the Forest Administration aiming to achieve a coordinated approach to integrated management. It is essential to ensure the effective functioning of this Steering Committee, including through regular meetings, and its input to transboundary
coordination and management. It is essential that the national parks of both States Parties maintain effective and legally adopted management plans, and an adopted management plan for the Białowieża National Park (Poland), to support its inclusion in the property, is an essential and long-term requirement.

It is essential to ensure that the integrated management plan for the property addresses all key issues concerning the effective management of this property, particularly forest, meadows and wetlands management, and that it is adequately funded on a long term basis to ensure its effective implementation.

Effective and well-resourced conservation management is the main long-term requirement to secure the property, and maintain the necessary management interventions that sustain its natural values. Threats that require long-term attention via monitoring and continued management programmes include fire management, the impacts of barriers to connectivity, including roads, firebreaks and the border fence. There is also scope to continually improve aspects of the management of the property, including in relation to ensuring connectivity within the property, and in its wider landscape, and to also secure enhanced community engagement.

4. **Commends** the State Parties of Poland and Belarus for their efforts to establish agreements aiming to enhance the coordination and effective management of this transboundary property.

5. **Requests** the State Party of Poland, as a matter of urgency, to:
   a) adopt the new Management Plan for Białowieża National Park as soon as possible, and by 1 October 2014 at the latest, and to provide a copy of the adopted and approved plan to the World Heritage Centre when available;
   b) establish as a matter of urgency the Steering Committee between the National Park and the Forest Administration to ensure the integrated planning and management of the Polish side of the property, and to provide adequate financial resources for the effective functioning of this Steering Committee.

6. **Also requests** the States Parties of Poland and Belarus to:
   a) establish as a matter of urgency the Transboundary Steering Committee that will coordinate, promote and facilitate the integrated management of the property;
   b) provide adequate human and financial resources to ensure the effective functioning of the Transboundary Steering Committee;
   c) expedite the preparation and further official adoption of the integrated management plan for the property addressing all key issues concerning the effective conservation and management of this transboundary property, particularly those concerning forest and wetlands management, and the need to increase functional ecological connectivity in the property, and to reduce the existing large network of roads and fire prevention corridors;
   d) ensure that this integrated management plan is adequately funded to ensure its effective implementation, and;
   e) maintain and enhance the level of cooperation and engagement of local communities that have been achieved during the preparation of this nomination as to ensure their contribution to the effective management of the property.

7. **Further requests** the States Parties to submit, by 1 February 2016, a joint report, including a 1-page executive summary, on the state of conservation of the property, including confirmation of progress achieved on the above points, for examination by the World Heritage Committee at its 40th session in 2016.
Map 1: Evolution of existing World Heritage site

Map 2: Proposed extension and buffer zone