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CODE OF QUALITY MANAGEMENT FOR WORLD HERITAGE BEECH FOREST

O.T3.2 Guideline for component part management

Version
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Juliane Geyer, Marcus Waldherr, Julia Fleck, Pierre Ibisch

EBERSWALDE UNIVERSITY FOR SUSTAINABLE DEVELOPMENT, Centre for Econics and Ecosystem Management

Eberswalde University for Sustainable Development

NATIONALPARK KALKALPEN

STAATLICH ANERKANNTER ERHOLUNGSORT Angermünde echt.natürlich

PAKLENICA Nacionalni park National Park

EUROPEAN WILDERNESS SOCIETY Let's get Wild!

ZAVOD za GOZDOVE SLOVENIJE Slovenia Forest Service

NLC NÁRODNÉ LESNÍCKE CENTRUM NATIONAL FOREST CENTRE

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Abbreviations

BR	Biosphere Reserve
BZ	Buffer zone
CP	Component part
CQM	Code of Quality Management
IMS	Integrated Management System
JMC	Joint Management Committee
NP	National Park
OUV	Outstanding Universal Value
PA	Protected area
WH	World Heritage
WH BF	World Heritage Beech Forest (Meaning the serial WH site “Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe”)
WHC	World Heritage Committee
WP	Work package

1. Introduction

1.1. Aim of the Code of Quality Management

The *Code of Quality Management for World Heritage Beech Forest* (CQM) is intended to ensure high quality and effectiveness of the management of individual component parts (CP) belonging to the serial World Heritage (WH) site "Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe" (WH BF). In this regard, it can function as a common standard for CP management that is applicable to the entire serial WH site and beyond. The CQM provides principles and criteria for WH BF CP management reflecting the common goals and objectives of the WH site and thus of all its CPs. In order to be effective and of adequate quality, CP management must follow all of those. In this sense, it primarily addresses those that are responsible for the management of individual CPs or CP clusters to evaluate, guide and improve their efforts of meeting all the requirements of a WH site, and to deliver high quality management. The CQM has the potential to qualify for a standard guidance and assessment tool for the entire serial WH BF site if it is institutionalised and coordinated accordingly.

The CQM pursues the overarching and uncompromising goal of CP management, which can be summarised as follows:

> *Effective protection of the ecological integrity and the Outstanding Universal Value of the component parts of the serial WH site "Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe" for present and future generations.*

In this context, the CQM serves integrative CP management in several ways:

Guidance	The CQM can help local managers to successfully tackle the mammoth task of effectively managing Natural WH. The principles and criteria of the CQM resemble the main goals and objectives and can thereby guide management planning of CPs or other beech forest sites. It helps creating awareness for effective management amongst WH managers by pointing out specific and general areas of responsibility. The CQM sets WH BF managers a task and supports them to become better at it over time.
Support	The CQM can also provide support for implementing strategies and actions for effective CP management. It could function as an implementation and argumentation aid where CP managers need further support from state parties, stakeholders, forest conservation actors or other WH BF managers (e.g., for acquiring resources, adapting laws, etc.) in order to enable high quality WH site management
Evaluation	The CQM can also facilitate the evaluation of management effectiveness of WH BF CPs. The assessment tool associated to the CQM can assist self-assessment by WH BF or assessment by external facilitators. Such evaluation can point out achievements and deficiencies of WH BF CP management and indicate necessary courses of action.
Comparison	Based on the evaluation of management effectiveness CP managers can compare their situation either with other CPs or with earlier assessments of their own site. This can relativize the outcomes of the evaluation, show trends in the development and indicate the urgency for action.

Adaptation	The CQM is also useful to adapt existing management plans to changing situations or new findings, i.e. goals, strategies, actions etc. By learning about important principles and criteria for effective WH BF CP management and/or by evaluating management outcomes with the help of the assessment tool, managers can identify and appropriately address gaps, insufficiencies or misalignment in management. It also encourages managers to enter and explore previously unknown areas of action.
Contribution	By providing a common standard for quality management, the CQM facilitates an effective contribution of individual CPs to the management quality of the serial WH BF site.
Exchange	On the basis of a common language and by defining concrete goals and fields of responsibility for CP managers the CQM can facilitate the exchange of experience, knowledge and best practice amongst WH BF managers and beyond. In addition, the identification and communication of individual achievements and deficiencies, i.e. strengths and weaknesses, by CP managers may help to find cooperation partners, to contact CPs for help or to offer assistance to others.

1.2. Rationale for the Code of Quality Management

Why do we need another standard telling us what to do? This is a question that some managers of WH BF have asked before and during the development process and might ask in future. The simple answer is: Because it helps CP management to become more effective in meeting all requirements for WH management set by the UNESCO. It is intended to make the complex task of managing a WH site CP easier to tackle. It summarises and translates requirements and recommendations instead of indirectly referring to all those duties that must be fulfilled. It provides concrete orientation with space for local interpretation and no rigid specification. It intends to guide management and not to simply judge it. The CQM relies on and motivates self-responsibility, self-organisation and commitment instead of confronting managers with stringent external assessment that might be discouraging.

All WH BF component parts already went through a strong auditing process within the WH nomination process. All CPs are (indirectly) under regular surveillance of the WH Committee and the IUCN to make sure they meet the WH requirements. The CQM does not place another burden on management but is a supporting tool assisting CP managers in getting their management right and to fulfil general and site-specific management requirements at a high standard. If applied well, the CQM will not necessarily increase the workload of CP managers but rather guide and frame daily conservation management planning and implementation work.

Besides receiving guidance in management, managers of WH BF component parts will gain knowledge on the values to be generated and maintained by CP management. They will develop their knowledge and skills of integrative protected area management and the interdependence of biodiversity conservation and human well-being. In addition, they will certainly learn what a great and grateful task it is to care for Natural WH and the European beech forest ecosystem. The CQM will support CP managers identifying and communicating their stories of managing World Heritage, to make their work, their achievements and challenges visible for influential actors like local, regional and national authorities or potential donors and to underline their importance for their region, their country and the whole of Europe.

The outcomes for the serial WH site are also diverse. The CQM can become a management standard for the whole site guiding individual CPs in their management, no matter whether they have been associated to the site for long or just entered recently. It can guide the concerted effort to implement a functional management system for the WH BF site as required by the World Heritage Convention (WHC). The CQM will ensure that all CPs strive for the same goals and follow the same principles in order to protect the site's

OUV. The CQM can guide collaborative knowledge generation and management in joint projects or research activities and constantly keep track of achievements and deficiencies. It will also facilitate active exchange of knowledge, experiences and best practices by providing a common language for all CPs.

2. Development of the CQM – process and methodology

2.1. Methodology and cooperation formats

2.1.1. Review of literature and documents

Review of existing conservation standards

As first step, a detailed study was prepared, compiling the available and applied management quality standards in conservation: *BEECH POWER Analysis of existing Quality Standards in Conservation as Input for setting up a World Heritage Beech quality standard (D.T3.1.1)*. This study was prepared in collaboration with all project partners and provided valuable input such as knowledge on existing conservation standards, and literature on conservation management effectiveness approaches from other scientific fields. The standards were analysed in the study and gaps for new developments were identified.

The study revealed several characteristics and important features of a good quality standard, which were taken into account for the development of the CQM:

- Clear goal/target against which to judge its impact (target-/outcome-/impact-orientation)
- Clear wording (ideally following standard rules for wording which clearly define requirements, recommendations, permissions and possibilities.)
- Organisation in principles, criteria and indicators (PCI)
- The possibility to adapt and adjust the standard should be foreseen via regular updates.
- Multi-disciplinary and/or multi-stakeholder approach for the development phase.
- Justification of either self- or third-party certification assessment.

Requirements and recommendations for effective WH BF component part management

The first step of this analysis was to find and select relevant documents that provide requirements and indicate the potential for improving management quality of WH BF component parts. Two types of documents correspond to two levels of requirements:

1) general policies with regard to the WH convention, and

2) specific documents with regard to the serial WH BF site (see Table 1).

After a first rapid reading through the documents, common themes relevant for the management of individual CPs of the serial WH BF site were identified. Those were synchronised with findings of other guideline documents and studies on effective conservation and WH management (e.g., UNESCO 2008, Leverington et al. 2010, UNESCO, ICCROM, ICOMOS, & IUCN 2012, Geyer et al. 2017). As a result, eleven thematic categories of quality management in the CPs of WH BF were defined. These categories built the framework for further thorough analysis and allowed sorted compiling of more detailed information from those various sources.

Table 1: Overview on relevant requirements and documents for WH BF component part management.

General policy of the WH Convention
World Heritage Convention
Operational Guidelines for the Implementation of the World Heritage Convention
Policy for the integration of a sustainable development Perspective into the processes of the World Heritage Convention
The Budapest Declaration on World Heritage
World Heritage Capacity Building Strategy
The World Heritage Centre's Natural Heritage Strategy
Policy document on the impact of Climate Change on World Heritage properties
Strategy for Reducing Risks from Disasters at World Heritage Properties
Strategy to Assist States Parties to Implement Appropriate Management Responses (Endorsed by World Heritage Committee at its Decision 30 COM 7.1)
Individual decisions of the World Heritage Committee
Case Law - Synthesis based on relevant Committee decisions
World Heritage Tourism Programme (adopted with Decision 36 COM 5E)
Site-specific documents
Nomination dossier & supplementary material
Joint Declaration of Intent
Advisory Body Evaluation (IUCN) 2017
Decision 41 COM 8B.7 (2017)
Decision 42COM 7B.71 (2018)
Decision 43COM 7B.13 (2019)

2.1.2. BEECH POWER project products and results

The contents of the CQMwere continuously coordinated and aligned with other products of the BEECH POWER project. At the same time, those products and results were adaptively accounted for in the development process of the CQM:

- BEECH POWER Regional studies on needs, potential and requirements for good management by relevant stakeholders for WH BF sites in Austria, Germany, Slovakia and Slovenia (D.T3.2.1)
- BEECH POWER Analysis on the specific requirements for improved management quality in target areas by WH status (D.T3.2.2)
- BEECH POWER Strategy for the improvement of management quality in the project target areas (O.T3.1)
- BEECH POWER Participatory situation analysis for WH BF sites in Germany, Slovenia and Croatia (D.T1.1.2)
- BEECH POWER Participatory strategy development for WH BF sites in Germany, Slovenia and Croatia (D.T1.2.1)
- BEECH POWER Governance strategy I – Activating and involving regional stakeholders in participatory planning processes (O.T1.1)
- BEECH POWER Governance strategy II – Integrating natural heritage in regional and communal sustainable development (O.T1.1).
- BEECH POWER Marketing and communication concept for World HeritageWH Beech Forest Grumsin (D.T1.3.8)

- BEECH POWER Marketing concept – Component part Snežnik (D.T1.3.8)
- BEECH POWER Marketing concept – Component part Krokar (D.T1.3.8)
- BEECH POWER Strategy for conflict management in buffer zones of WH Beech Forests (O.T2.2)
- BEECH POWER Strategy for the active involvement of stakeholder in WH beech forest buffer zone management (O.T2.1)
- BEECH POWER Guideline for ecosystem-based forest management in landscape conservation buffer zones of World Heritage Beech Forests (D.T2.3.3)
- BEECH POWER Strategies for ecosystem-based forestry practices in buffer zones of WH Beech Forest PAs (O.T2.5)
- BEECH POWER Strategies for visitor management and knowledge transfer in buffer zones of WH Beech Forests PAs (O.T2.3)

2.1.3. Participation and cooperation

2.1.3.1. Expert workshops

Expert workshop I

The aim of the workshop was to discuss and develop a potential structure and a set of criteria and indicators for a quality standard that enables protected area managers to evaluate the effectiveness and quality of their management of WH BF component parts.

The workshop was held in Eberswalde 24th-26th February 2020 and was the only presence meeting within this process. Apart from representatives of the BEECH POWER project partners, additional scientific and operational expertise was provided by representatives from associated partners, including experts from the European Beech Forest Network and the current (and future) Coordination Office of the serial WH BF site.

The workshop produced several outcomes and agreements that significantly shaped the subsequent process. Workshop participants agreed:

- that instead of a standard, a common code of best practice for WH BF management will be developed to be of better help for site managers and to enable them to ask the right questions and strive for an ongoing improvement of management;
- that the code should have two functions: 1) to evaluate management effectiveness and 2) provide a tool and recipe to improve management;
- on eight ecosystem-based “principles” or “descriptors” – five spatial and three cross-cutting thematic ones;
- that existing official framework documents and agreements already valid to the WH BF property have to be integrated in the code;
- that best practice will be listed in the form of a “desired outcome” in the code – reflecting long-term targets;
- that the focus of the code is on management, not on area quality.

Expert workshop II

The format of the second expert workshop was adapted and transformed into a series of cooperative online activities including interactive work on shared documents as well as two main online workshops between 16th October and 17th November 2020 due to pandemic requirements. Those online activities facilitated the

cooperation of several partners from the BEECH POWER project, the WH BF site as well as the European Beech Forest Network.

The aim of the workshop unit was to discuss and to find an agreement on the basic structure for the *Code of Quality Management of World Heritage Beech Forest* including concrete principles and criteria. Further, it aimed at developing and discussing a knowledge base for the development of indicators. The final intended outcome of the workshop was to compile suggestions and to come to a preliminary agreement on the fundamental frame for the structure of the handbook accompanying the CQM as well as for future field applications of the quality assessment.

During this interactive series all participants agreed on the basic contents and structural concept of the CQM. It was agreed that the CQM will follow the PCI concept with principles, criteria and indicators and will combine two dimensions – a scope dimension reflecting the five spatial descriptors agreed in the first expert workshop, and a content dimension that connects to and elaborates on the three cross-cutting descriptors of the first workshop. These two dimensions were to reflect the complexity of WH BF CP management and to cover the diverse requirements for good quality management on WH site level. In the end, ten categories of quality management were identified in the content dimension and associated criteria and indicators were discussed.

Furthermore, the structure for the CQM handbook was discussed and agreement on basic aspects was reached. Also first thoughts and suggestions were exchanged and collected with regard to the concept and procedure of an application of the CQM in the field.

2.1.3.2. Online focus interviews

Four semi-structured online interviews were conducted in March and April 2021 with protected area managers in charge of WH BF component parts in Austria (Kalkalpen NP), Germany (Grumsin, Schorfheide-Chorin BR), Croatia (Paklenica NP) and Slovenia (Krokar). The aim was to learn about successful management practices, to identify indicators for effective and ineffective management and to find management visions for the respecitve CPs as part of the serial WH BF site.

2.1.3.3. Online questionnaire

An online questionnaire was open for participation by invited project partners, associated partners and collaborators of the European Beech Forest Network from 10th March until 7th April 2021. The aim was to identify needed approaches and action in integrative CP management and to identify indicators for good and effective management.

2.1.3.4. Interactive online pin board

All project partners, associated partners and additional collaborators of the European Beech Forest Network were invited to contribute to an interactive online pin board to concretise the framework of the CQM. The aim was to develop a common vision for WH BF component part management, to identify and define values to be generated and protected by CP management and to find corresponding indicators for evaluating management effectiveness in WH BF component parts.

2.1.3.5. Feedback and agreement round with partners and experts

A final feedback and agreement round with all project partners, associated partners and additional collaborators of the European Beech Forest Network (EBFN), using a shared online document open between

22nd July and 22nd August 2021, concluded the process of framing the CQM with principles, criteria and indicators before the test application.

2.1.3.6. Test application

The application of the assessment tool of the CQM was tested in WH BF components parts embedded in Kalkalpen NP (Austria) and in the CP Grumsin, which is embedded in the Schorfheide-Chorin Biosphere Reserve (Germany). The test applications took place between September and December 2021. The two test areas where chosen to achieve maximum effectiveness and efficiency of the test application and reduce risks. In both areas involved (associated) project partners are directly responsible for the respective CPs, speak the same language (German), the management responsibility of both areas is clear (compared to areas in Slovakia or Slovenia) and there is very good background information available for both areas. Since the test application was assisted and moderated by an external partner, practicality in terms of language and access to additional knowledge was essential.

The test application served two functions:

1. a first evaluation of management effectiveness of two WH BF component parts
2. the evaluation and adaptation of process and protocol proposed for the CQM assessment tool.

After the conduction of the assisted self-assessment producing first results, the partners from the test areas gave their feedback with regard to practicability, feasibility, comprehensiveness, intelligibility and benefits of the CQM assessment tool. The external consultant assisted the area managers with the self-assessment and evaluated the tool based on the feedback by area managers and own observations. The CQM content and structure have been fundamentally revised after the first test run and better adapted to the specific needs and working approaches of area managers.

2.1.3.7. Pilot application

The CQM was applied in a variety of activities within the BEECH POWER project. The structure of the knowledge exchange platform is oriented towards the structure of the CQM. The CQM assessment tool was applied in five pilot areas towards the end of the BEECH POWER project including CPs in project target areas in Paklenica NP (Croatia), Poloniny NP (Slovakia), Kalkalpen NP (Austria), Grumsin (Germany) and in Krokar (Slovenia). Furthermore, the principles and criteria of the CQM were also used to check the preliminary contents of the management plan draft for Paklenica NP (Croatia) for their conformity with the CQM and to make according amendments with reagrd to planned management activites.

Those pilot implementation actions explored, tested and confirmed the diversity and flexibility of the CQM with its associated assessment tool as well as its applicability for very different situations of indiviudal CPs. All experiences and findings drawn from the pilot assessment supported the further amandement and refinement of the content and structure of the CQM and its assessment tool.

2.1.4. The development process

Study on conservation standards	•Overview of the state of the art; evaluate structure and elements to be applied; identify gaps for new developments
Regional Studies	•Needs, potentials and requirements referring to good management by relevant stakeholders
Expert Workshop I	•Basic agreements on structure, function and application of the code
Literature review	•Requirements and recommendations of WH site management
Expert online workshop series II	•Further discussion and agreement on structure and application of CQM (principles, content categories)
Online questionnaire	•Identify needed management actions and indicators for (good) management
Online focus interviews	•Identify (good) management practices, indicators for good/bad management and find management vision for the respective site(s)
Interactive online pin board	•Develop a common vision for WH BF component part management; identify values to be generated and protected by CP management
Feedback and agreement round	•Conclude the process of framing the CQM; agreement on values, principles and criteria with project partners and external experts
Test application	•Testing the assessment process, principles, criteria and indiators for applicability and feasiblity for practitioners in 2 test areas
Revision	•Revision of the CQM structure and content; adapting principles, criteria and indicators as well as assessment process to practitioners' needs and capacities
Final draft agreement round	•Conclude the process of revising the CQM, agreement on principles, criteria and indicators with project partners
Pilot application	•Apply the CQM and assessment tool in 5 pilot areas
Finalisation	•Final refinement

3. Principles and criteria of WH BF Quality Management

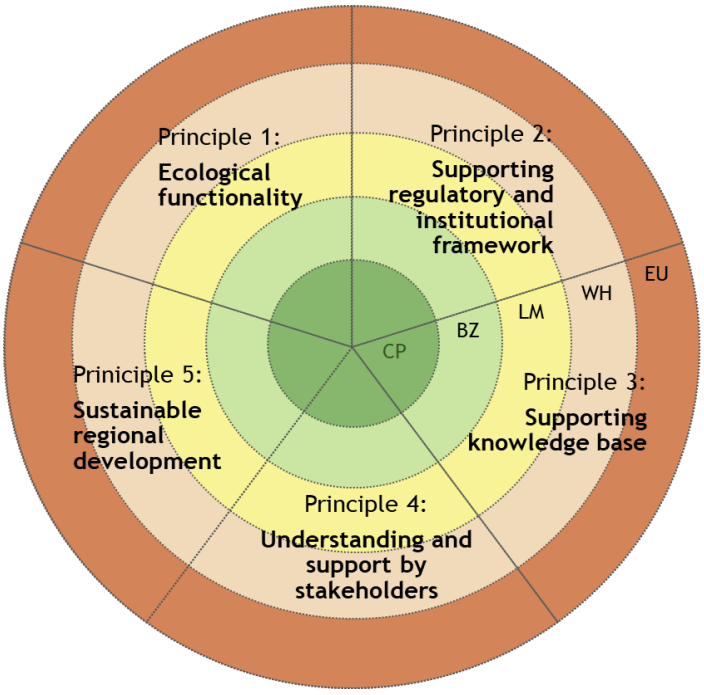

Figure 1: Schematic overview of the principles and targeted management levels of the Code of Quality Management. CP = WH component part, BZ = buffer zone, LM = surrounding landscape matrix, WH = serial World Heritage Beech Forest site, EU = European beech forest

3.1. Levels of effectiveness of integrative component part management

In order to be fully effective, management of WH BF component parts must interactively address five different spatial and thematic contexts. High quality management of the CP does not only include the management of the official property and its buffer zone (BZ) itself in a local context, but also accounts for the surrounding landscape matrix (LM) as well as the context of being part of a serial WH site embedded in the network of European beech forest in general. Those different scopes therefore correspond to the five levels where integrative CP management should have its effect. Within these levels of effectiveness, there is a gradient in the variety and intensity of, as well as the formal responsibility for possible actions and contributions by CP managers.

All management levels apply to all principles of the CQM. Criteria apply slightly more specifically to certain management levels. Some indicators apply to only one and others to several management levels. To fully comply with the five principles for quality management, criteria for all management levels must be met. Hence, for a comprehensive evaluation of management quality, all indicators provided by the assessment tool need to be assessed.

Scope I: Component part (CP)

Within this scope, management focuses on the CP itself with the officially assigned WH status. In this context, management must ensure ecosystem functionality and integrity in the CP and protecting the OUV.

Scope II: Buffer zone (BZ)

Within this scope the management of the area immediately surrounding the property is addressed – the officially designated BZ. The BZ has a buffering function and will be officially acknowledged and delineated. Its function is to mitigates negative (outside) influences on CP integrity. Since it not only buffers but can also have negative impacts on the integrity of the property in certain cases (e.g. illegal land use, changing conditions due to climate change) it is very important to vigorously include it into integrative CP management.

Scope III: Surrounding landscape matrix (LM)

(Land use) Activities in the landscape embedding the CP with its BZ can have a major influence on the integrity of the CP. Therefore, integrative CP management must ensure that the embedding landscape matrix does not exert pressures on the CPs and supports maintaining the OUV. Integrative CP management must target sustainable land use in the embedding landscape matrix to minimize negative impacts on ecosystem functionality of the CP. This scope goes beyond the tangible responsibility, accountability and authority of (most) CP management units. However, it is very important for effective WH site management and a major challenge to overcome. At the same time, this holds great potential for sustainable development as one required mission for UNESCO WH sites in general and for regional sustainable development maintaining or enhancing local human well-being in particular.

Scope IV: Serial WH BF site (WH)

In order to be of high quality, integrative CP management must contribute to functional and effective management of the entire serial WH BF site. The scope of the entire WH BF site also reaches beyond the immediate field of activity of many CP managers. However, as the CPs belong to an overarching complex – the serial WH property – they must actively acknowledge this and contribute to management on that higher level of organisation as well. Only then CP management can become effective and the OUV of the site be protected.

Scope V: European beech forest ecosystem

As all CPs are embedded in the European beech forest ecosystem, quality management requires that their management contributes to the connectivity of European beech forest ecosystems and the protection of old-growth forests in Europe. Even more than the two preceding levels of management effectiveness, this one supposedly goes far beyond the imaginable scope of action for many CP managers. However, the WH property is not only valuable on itself but also holds a representative function for European beech forests ecosystems in general. Thus, the site as a whole as well as all CPs for themselves should advocate for and promote the protection of European beech forest and other old-growth forests in general. This in turn is important for effective CP management and protecting the OUV.

3.2. Principles of integrative component part management

All CPs of the serial WH BF site belong together and although geographically more or less dissociated they share a common identity and should pursue a common vision. This is why they all cooperate and interact in order to achieve common goals and to create and protect common values. In order to reach these goals and values of the common vision, each CP has to contribute their part. That means that also the management of each CP should pursue those common goals and strive for generating and protecting those common values according to the local and individual conditions and circumstances. There are five main values systems that

CP management shall generate or maintain: ecological functionality; a supporting regulatory and institutional framework; a supporting knowledge base; understanding, appreciation & support by stakeholders and other actors; and community well-being and regional sustainable development. From those underlying value systems, the five main principles of Quality Management for WH BF CPs can be derived:

- ➔ **Principle 1: Management prioritises ecological functionality of the component part and the embedding ecosystem.**
- ➔ **Principle 2: Management ensures a supporting regulatory and institutional framework.**
- ➔ **Principle 3: Management generates, maintains and develops a supporting knowledge base.**
- ➔ **Principle 4: Management creates a high level of understanding, appreciation & support of the WH BF component part by stakeholders and other actors.**
- ➔ **Principle 5: Management fosters community well-being in a framework of ecosystem-based regional sustainable development.**

3.3. Criteria of integrative component part management

For each of the five principles specific criteria for CP management can be defined. The criteria reflect the content dimension of effective management. Criteria can be defined as conditions that need to be met in order to comply with a principle (compare e.g., BBOP 2012, European Wilderness Society 2019). They describe how the five principles can be reached, by what means or strategies principles can be served. The criteria describe the concrete targets that CP management should strive for in order to be effective. The CQM comprises 15 criteria. Most criteria relate to more than one level of management effectiveness.

3.3.1. Principle 1: Management prioritises ecological functionality of the component part and the embedding ecosystem

The overarching goal for conservation and management of the serial WH site is the protection of the OUV; this includes the sustenance or enhancement of the conditions of integrity, i.e. wholeness/intactness at the time of inscription (UNESCO 2021). The ecological integrity of the CP is the most important goal of management and the greatest value for the inscription as WH site. Here, integrity is considered almost synonymous with very high ecological functionality, although integrity also sometimes implies a certain degree of preservation of a historical untouched condition. However, ongoing evolutionary and natural dynamic processes resulting in changes to the structure and composition of CPs are considered part of ecosystem integrity and functionality and must be equally safeguarded to maintain the OUV.

The functionality of European beech forests and old-growth forests depends on several factors. In summary, high levels of biomass, diversity and network support ecosystem functionality (Ibisch & Hobson 2014, Geyer et al. 2017, Schick et al. 2019). The size and shape of forest areas is important for ecosystem functionality. Connected to that are edge effects, fragmentation, accessibility, “quiet” areas, territorial needs of certain species etc. Ecosystem properties such as the forest structure, the species composition, the canopy cover,

the water balance or microclimatic conditions have an influence on ecological functionality. The ecological connectivity of forest ecosystems with other highly functional ecosystems such as other forests influences are crucial for their functionality. The undisturbed flow of ecological processes, both within and beyond ecosystem boundaries is essential for ecosystem functionality. In the end, the degree of degradation of all of those factors is decisive for the functionality of the forest ecosystem.

The aspect of integrity as stated in the OUV of the WH BF site applies on at least two levels of organisation: the serial site as a whole and the individual CP. Thus, there are two perspectives on sustaining or enhancing the condition of integrity.

The integrity of each individual CP is the foremost goal of CP management. All CPs supposedly have a good condition of integrity at present - otherwise they would not have been designated WH. Any deviation of the state of integrity in the CP is therefore a sign for ineffective management. Since ecological processes do not stop at the border of the CP in either direction, the degree of ecological functionality in adjacent areas is of great importance and also mirror for the integrity of the CP. The higher the ecological functionality of surrounding ecosystems, the lower will be the adverse impacts on the CP. The more humans modify, use and dominate the ecosystems in the surrounding landscape matrix, the more threats for the CP can arise from the surrounding landscape matrix causing ecological stresses in the CP. These stresses then compromise CP functionality and integrity. Adverse impacts can be caused by direct human interventions such as land and resources use or infrastructure development, or by more indirect factors such as human-induced climate change. Both threaten the ecological functionality within and around the CP. At the same time, both can be better buffered by functional and resilient ecosystems.

At the same time, the integrity of the whole WH BF site must be sustained as a joint mission of all CPs. Being parts of a serial WH site, the CPs should reflect cultural, social or functional links over time that provide, where relevant, landscape, ecological, evolutionary or habitat connectivity (UNESCO 2021). Therefore, the WHC demands to improve the ecological connectivity between CPs across the property as well as for greater connectivity across the whole beech forest network[1].

That means on the one hand, that WH beech forest must be ecologically contiguous and allow for an effective functioning of natural processes. Ecological connectivity between CPs plays an important role here. On the other hand, the WH site is embedded in a complex of European forests, that – similar to the landscape surrounding individual CPs – is relevant for the ecological functionality of the forests within the WH BF site by supporting ecological functions and resilience. Maintaining and expanding the existing, ecologically connected complex of primeval and natural beech forests that encompass and connect the CPs is therefore another important focus with regard to sustaining the WH site's integrity.

Criterion 1.1: There are no negative impacts of human activities on the CP.

The overarching goal of CP management is the protection of CP integrity. External threats such as human activities can cause stress in the ecosystem of the CP and disturb its integrity. This means that one or more key ecological attribute(s) (i.e. referring to biomass, information and/or connectedness) of the ecosystem is or are degraded by this disturbance. This can show in changes of structure or composition, for example. Ecosystem functionality is reduced by that degradation and with it the remaining resilience of the ecosystem. With reduced resilience the ecosystem becomes more vulnerable to further changes, such as those induced by climate change. However, ongoing evolutionary and natural dynamic processes resulting in changes to the structure and composition of CPs are considered part of ecosystem integrity and functionality.

Human activity can impair the ecosystem directly by occurring in the area itself, e.g., walking through, camping, (illegal) logging causing stresses like damaged soil and vegetation, disturbed wildlife or reduction

[1] Compare: Advisory Body Evaluation (IUCN, 2017), Decision 41 COM 8B.7 (2017), Decision 43COM 7B.13 (2019)

of biomass. Most human activity encountered in the CP will be illegal or undesired with regard to existing regulations. In this case awareness-raising, education and stakeholder involvement are appropriate approaches. However, if human activities in the CP causing ecological stresses are legal, the adaptation of the regulatory framework will have to be targeted in order to reduce those stresses.

Human activity in the surrounding areas like tourism activities and logging in the BZ or agriculture and infrastructural development in the embedding landscape matrix can also have an indirect negative impact on CP integrity (by e.g., air pollution, emission, microclimatic changes, water deprivation, noise, nutrient input, invasive species etc.). They mostly evolve as edge effects at first, but can also affect the whole CP eventually.

Even longer-term human intervention in the area or beyond can cause indirect effects on the CP integrity. One example is the expulsion or eradication of predators or hunting in general leading to browsing pressure and increased game impact. Game animals are a crucial component of forest ecosystems, but their overabundance can cause problems. Overgrazing can influence the structure of forests, stand regeneration and growth of seedlings. Some tree species are more affected than others, which can cause artificial imbalances in forest structure. Furthermore, human-induced climate change will eventually result in stresses of the forest ecosystem. Even though the effect is very indirect, the fact that those impacts are caused by humans and can be managed to some point means that they must be taken into account here.

Ecological stress can manifest itself in form of a change in the behaviour and abundance of indicator species or sensitive species (e.g. woodpeckers, carnivores, birds of prey or saproxylic species), in a change of tree mortality, in a change of forest composition and structure, in a change in the abundance of site-specific species but also in changes of abiotic properties like microclimate, (ground-)water level or soil moisture. Almost more important than ecosystem properties like biomass and diversity as assets of ecological functionality are ecological processes like self-regulation and ecosystem development. Those processes are often intervened by human activities. Identifying those stresses of the ecosystem will indicate best in how far the functionality of the BZ and thus its buffering function can currently be guaranteed. In order for the BZ to fulfil the greatest possible buffer function for the protection of the CP, the deviation of ecological properties and functioning should be as small as possible compared to the CP itself. The smaller the ecological difference between the two areas, the more effectively adequate protection of the CP can be ensured.

Criterion 1.2: The component part is ecologically supported by functional ecosystems in which it is embedded.

Ecological processes do not stop at the border of the CP in either direction. Therefore, the degree of ecological functionality in adjacent areas is of great importance for the integrity of the CP and can in turn mirror connected changes and developments. The higher the ecological functionality of the surrounding ecosystems, the lower will be the adverse impacts on the CP.

The buffering function of the BZ depends on the type, ecological functionality and degree of management of the included ecosystems. The higher ecological functionality is in the BZ, the higher will be its resistance and resilience to change and therefore its buffering effect. The more the BZ resembles the forest ecosystem(s) in the CP (e.g., levels of living and dead plant biomass, structural diversity, natural processes like regeneration, collapse and decay, canopy closure, species composition and abundance, microclimatic factors such as surface temperature and humidity) the lower will be the potential for negative impacts on the CP.

The ecosystems of the embedding landscape matrix and their management also have an influence on the ecological functionality of the CP with its BZ. Depending on the kind of ecosystems and their degree of degradation and use intensity, their influence can be positive or negative. CP functionality and integrity as well as BZ functioning is best supported (or least compromised) if the surrounding landscape matrix itself

has a high ecological functionality with a low degree of alteration by humans. The smaller the differences of ecological properties and functioning between the CP and the surrounding landscape are, the more effectively integrity of the CP can be maintained and the more effectively adequate protection of the CP can be ensured. The stronger the ecosystems of the surrounding landscape deviate from the CP, the more they will exert and exacerbate pressures on CP integrity (e.g. due to edge effects). In order to support CP integrity, management should therefore aim for high levels of ecosystem functionality, i.e. high levels of biomass, diversity, and connectivity in the in the ecosystems embedding and surrounding the CP.

Apart from the direct landscape matrix, the CPs of the serial WH BF site is also embedded in the more or less connected network of European beech forests and old-growth forests. The ecological functionality of WH BF component parts and network also depends on the functionality and connectivity of other natural beech forests and old-growth forests. Thus, one task of CP management is to keep an eye on the entire forest situation in Europe and to safeguard its functionality, particularly those of neighbouring beech and other old-growth forests.

Criterion 1.3: The component part is ecologically connected to other beech forests

Each WH BF component part is not only one of many individual CPs of the serial WH site whose individual ecological integrity is priority of their respective management. Each CP also belongs to this serial entity contributing to the entirety of all these areas and their interconnectedness.

In order to fully support the integrity of the CP, ecological connectivity of the CP and BZ with neighbouring beech or old-growth forests or other highly functional ecosystems must be safeguarded. With regard to the requirement of connectivity within the serial WH BF site, CP management must target ecological connectivity with neighbouring and other CPs in order to support effective functioning of natural processes and to contribute their part to the entire site's OUV. If the connectivity to nearby beech forests and/or old-growth forests and/or with adjacent CPs is ensured for each CP, this adds to a network of (inter-)connected beech and old-growth forests allowing for effective functioning of naturel processes also over larger areas or longer distances as required by the WHC.

CP management must strive for adequate connecting ecosystems such as forests or a functional network of ecological corridors and vegetation structures supporting the ecological connectivity with neighbouring WH BF component parts and other beech forests. Closer areas will allow for a better connectivity than larger distances. Ecosystem with higher functionality and resemblance with the CPs, i.e. natural forests, will support the connectivity between CPs better than others. Ecological structures with vertical green such as tree-lined watercourses, hedges, tree rows or wooded strips but also other green structures such as meadows or extensive cropland or pastures will also facilitate ecological exchange and connectedness to some degree. Human infrastructure such as settlements, roads, extraction areas or any other kind of soil damage will impede or even prevent ecological connectivity.

3.3.2. Principle 2: Management ensures a supporting regulatory and institutional framework.

To be deemed of Outstanding Universal Value, a WH property must not only meet the conditions of integrity and/or authenticity, but all properties inscribed on the WH List must have adequate long-term legislative, regulatory, institutional and/or traditional protection and management to ensure their safeguarding (UNESCO 2021).

For effective CP protection and management, it is necessary that a clearly defined legal and regulatory framework assures the protection of the CP from social, economic and other changes and resulting pressures negatively impacting the OUV for the long term. An adequate legal framework is further necessary to

institutionalise strategies and to enable necessary strategic actions that go beyond the administrative borders of the CP. This means that adequate protection at the national, regional, municipal, and/or traditional level for the property (UNESCO 2021) are in place, sustained and implemented. Legislations, policies and strategies affecting WH properties should not only ensure the protection of the Outstanding Universal Value, but should at the same time support the wider conservation of natural and cultural heritage, and promote and encourage the active participation of the communities and stakeholders concerned with the property. These are seen as necessary conditions for its sustainable protection, conservation, management and presentation (UNESCO 2021).

Further, it is required that management authorities of CPs must ensure management goals and that strategies comply with the existing legislative and policy frameworks on one hand. On the other hand, any kind of legislation and regulation should not contradict or stand in conflict with WH requirements and the goals and criteria of CP management. Thus, beyond merely complying with existing law, WH CP management might require additional regulations supporting effective management. It will be also in the responsibility of CP managers to actively demand, support and push the adaptation and development of relevant regulations.

Moreover, there are several requirements that a WH BF CP must fulfil due to its WH status and affiliation to the serial WH site. General requirements set by the WH Convention are already reflected in the CQM. However more specific requirements connected to individual CPs must be targeted by CP management. Only if all CPs comply with those requirements of the serial WH site will overall management of the serial WH site be effective and the OUV maintained.

Not only adequate legislative and regulatory framework conditions are essential for effective CP management but also a supportive institutional framework. This includes defined and clear management responsibilities, sufficient and clearly dedicated human and financial resources as well as comprehensive strategic management planning besides a network of supporting authorities and institutions.

Criterion 2.1: Integrative CP management complies with existing legal and institutional provisions.

Sharing the WH status with many other areas within and being part of the same serial WH site each CP is obliged to comply with the agreements and requirements associated to that (UNESCO, ICCROM, ICOMOS, & IUCN, 2012). Some CPs can fulfil those obligations better than others – depending on the specific situation – and for some areas there will be more effort necessary to meet all requirements to the satisfaction of different control bodies like the WH committee. General requirements set by the WH Convention are already covered in the CQM principles and criteria. However, some site-specific requirements and agreements are less binding, might only apply to certain CPs and/or change over time, so managers need to make sure that those are translated into CP management and implemented appropriately. This includes documents regarding the serial site resolved by the JMC such as the *Guidance document on buffer zone management and buffer zone zonation* for the serial WH BF site prepared by the Coordination Office and resolved by the JMC in 2021 or the WH site's Integrated Management System. This also comprises frameworks agreed on State parties level, site-specific WHC decisions as well as WH requirements according to reactive missions and periodic reporting[2].

Criterion 2.2: The legal and institutional framework positively supports the strategic management of the CP complex.

Many existing regulations and laws on national, international but also regional level already support and provide chances for WH CP management and conservation. However, often (conservation) regulations are insufficient to ensure effective WH CP protection and management, for example because they do not

[2] Official WHC documents can accessed via https://whc.unesco.org/en/list/1133/documents/.

specifically include or reflect the specific requirements of WH management or the role of the surrounding landscape matrix for CP integrity is not acknowledged. In order to comply with this requirement, CP management must ensure the legal and regulatory framework is adequate on all relevant levels to support the implementation of management goals and strategies. National legislation and local regulation must sufficiently support or at least not contradict the principles and objectives of CP management in order to ensure effective protection and management.

This means that the legal protection of the CP is, clearly defined, the strictest one possible, permanent and enabling non-intervention process protection in order to guarantee protecting the OUV and the integrity of the CP from negative human influences (IUCN 2006, Periodic Report 2014, IUCN 2017, WHC 2019). This includes the effective delineation of boundaries.

It further means that also the legal protection of the BZ is clearly defined, follows a strict protection regime and fully supports the buffering function of the BZ. The legal protection status of the BZ must exclude most human interventions and uses and ensure that the ecological functionality can be maintained or even enhanced. It comprises the effective and adaptive delineation of BZ boundaries.

An adequate legal framework also includes legal protection and land use regulations that ensure sustainable use of land and resources in the landscape matrix surrounding the CP and BZ with low impact on the functionality of respective ecosystems in order to ensure CP integrity. Even though CP managers (might) have no authority of action and no power of decision-making for the landscape outside the boundaries of the CP and its BZ, they must ensure that no negative impacts compromise the CP integrity. Since many pressures originate in or are exacerbated by ecosystem management and land use systems in the surroundings, certain legal provisions will be necessary to support the reduction of those pressures. To make management effective, it is therefore one task of WH BF CP managers to advocate for an adequate framework of legal protection and regulations of sustainable land and resources use in the surrounding landscape matrix.

Managers of WH BF CPs are also representatives of all European beech forests and have a certain responsibility in advocating for and ensuring adequate conservation of European beech forest. In order to maintain or restore ecological functionality for the long-term conservation of European beech forests and old-growth forests beyond the WH site itself, an adequate legal protection or regulations for management must be targeted by CP management. This also includes legal provisions ensuring ecological connectivity with and between those forest areas.

An adequate regulatory and institutional framework also means, that respective provisions do not counteract or contradict CP management goals and strategic approaches on any level. CP managers must therefore also ensure that frameworks and agreements on JMC and State Parties level fully cover and sufficiently support the protection and management requirements of individual CPs without any conflict or contradiction.

3.3.3. Principle 3: Management generates, maintains and develops a supporting knowledge base.

Knowledge is an important prerequisite for profound management and target-oriented monitoring. Only with sufficient and adequate knowledge and the awareness of uncertainty and non-knowledge, those responsible for the management of CPs can understand complex processes, define well-targeted strategies and make profound decisions. The richer, diverse and comprehensive the knowledge base is, the more precisely strategies can be developed and implemented and the more effective management can be. In order to implement management in a satisfactory manner, not only knowledge but also certain skills and the motivation to apply this knowledge in management are decisive.

For effective management it is crucial that knowledge of different formats and from different sources, sectors and disciplines is incorporated into planning and decision-making. Also, relevant knowledge and

information should be generated and shared in cooperation with different partners on local, regional, national and international levels. Research thereby addresses relevant questions for management planning, decision-making, monitoring and measuring effectiveness (resulting in an increased understanding of WH property, threats, stakeholders, resource use etc.). It will be necessary that CP managers develop research activities beyond the required monitoring and strive for joint projects and approaches. Not only the generation of knowledge is important, but also its efficient management and usage in analyses and decision-making. Hence, a comprehensive knowledge management system should facilitate the generation, documentation, sharing and transferring of knowledge of all sources, including local knowledge, monitoring results, information and academic research results.

Criterion 3.1: Those involved in integrative CP management have (access to) sufficient and adequate knowledge, expertise and skills to make profound management decisions.

For effective CP management, to ensure high-quality management decisions and thorough monitoring, managers and all other relevant actors need to have (access to) profound and comprehensive expertise and knowledge about the condition and ecology of the CP and BZ, about the value and management requirements of the BZ, about the ecology, impact and management requirements of the surrounding matrix as well as about human well-being in the region and regional sustainable development. Besides basic ecological data, this includes different fields of knowledge and expertise such as ecosystem theory, human well-being, socio-economy, culture, religion, local and/or historical knowledge of the area. Furthermore, management effectiveness relies also on knowledge about the values and management requirements of the serial WH BF site and about the situation, restoration and protection of beech and old-growth forests in Europe. Skills for knowledge management such as research and monitoring abilities must be available to CP management to ensure management effectiveness. The knowledge and skills needed can either be available directly in the responsible management units of integrative CP management or be readily accessible through good partnerships with experts, research institutes or agencies, for instance.

Criterion 3.2: Knowledge of different sources and formats is applied in component part management to support planning and decision-making.

CP management planning should be based on a solid fundament of knowledge on the ecology and evolution of the CP, on the values and management requirements of the BZ as well as on the ecology and impact of the surrounding landscape matrix and regional sustainable development. Since this can be interpreted from different perspectives, it is necessary to capture comprehensive knowledge of different kinds, from various sources and owners and of different formats.

Especially in the embedding landscape matrix there are many different actors and perspectives on the CP, land use management and protection requirements and decisions must consider a much larger range of argumentation than for the management of CP and BZ themselves. This is why it is especially important to capture comprehensive knowledge of different kinds, from various sectors, disciplines and sources as well as of different formats to inform management and make it more effective. The building of knowledge partnerships can make the application of knowledge in CP management more feasible.

Besides scientific knowledge also local or traditional knowledge, practical knowledge or historical knowledge can underpin CP management. Moreover, not only knowledge in written form, but also orally transmitted knowledge or knowledge expressed in songs, pictures or other cultural artefacts can be valuable for CP management planning and help to make it more effective.

Criterion 3.3: CP management contributes to collaborative generation, management and dissemination of knowledge on European beech forests and their management.

In order to develop the knowledge base not only for individual CPs but also for the integrated and coordinated management of the serial WH site as well as beech forest protection and management in general, it is important that CP representatives contribute to joint efforts to create, share and disseminate knowledge. For effective knowledge management CP representatives actively participate in and contribute to several joint research activities together with other CPs, in thematic working groups, in the exchange of knowledge and best practice and other knowledge management activities organised by the coordination office, other CPs and/or other actors beyond the site. It is important that knowledge on beech forest ecology, protection, restoration and management is actively distributed and shared with a wide range of actors from the local to the international level. It must be acknowledged that WH Beech Forest CPs are important sites for research and reference areas for the ecology of beech forest in Europe.

3.3.4. Principle 4: Management creates a high level of understanding, appreciation & support of the WH BF component part by stakeholders and other actors.

In order to ensure the protection of CP integrity in individual CPs but also with regard to protecting the OUV of the whole serial WH site, the understanding and support of associated values and management requirements by local stakeholders, national and international actors are essential. Only with a certain degree of understanding and accepting the WH site and its CPs, stakeholders will actively support and engage in the management of CPs and comply with rules of necessary protection and land use restrictions. High appreciation might even lead to self-motivated additional support of the CP management and protection by stakeholders or relevant actors. Management can only become effective if there are no conflicts and there is no opposition with regard to management objectives and approaches. It is crucial to develop and share a joint understanding of and vision for CP management with and amongst all stakeholders[3]. This is especially important with regard to the surrounding landscape matrix, where CP management relies on the cooperation with local land users and owners for strategy implementation. In order to support and implement management requirements, stakeholders have to know them in the first place, understand and respect them and then implement and actively support them for effective management. In the same way, however, the support by local, regional and national authorities, decision-makers and policy-makers is crucial for effective CP management and must be targeted in this regard.

Criterion 4.1: Stakeholders understand, accept and respect goals and corresponding regulations of integrative CP management.

In order to ensure the protection of CP integrity, it is essential that both local stakeholders and visitors know and understand the values of the CP as well as regulations associated with this (e.g., borders, access restrictions, rules of behaviour). It is essential that they agree to and respect those regulations and support their implementation. Only if people understand, why there is a border they should not cross and what values are at stake, can they motivate themselves to follow the rules. It is therefore an important prerequisite for successful CP management that especially local but also other stakeholders and actors know, understand, agree to, respect and implement management requirements for the CP, the BZ as well as the surrounding landscape matrix.

In order to generate understanding, approval, respect and support of CP management by a broad range of stakeholders it is important to raise awareness, sensitise and educate on relevant topics in diverse, targeted and appropriate ways and formats. Outreach and education must target the specific values and management

[3] Compare BEECH POWER Governance strategy I – Activating and involving regional stakeholders in participatory planning processes (O.T1.1)

requirements of the respective CPs. It helps if locals and other stakeholders are aware of the area's WH status, why it has been designated and its role for climate and biodiversity protection therein. To reach local support it is particularly important to communicate the role, which the CP has for regional well-being and regional sustainable development by providing essential ecosystem services. However, also the concrete role, management requirements and regulations for the BZ and surrounding landscape matrix must be sufficiently clear to all stakeholders.

In order to reach a broad range of stakeholders and recipients, it is important to become aware of different interest groups, target groups and reference groups and their specific background and needs. At least on local and regional level all stakeholder groups must be included in outreach and education on CP management with appropriate formats of information and education. However, also national and international stakeholders should be included to achieve full understanding and support for the CP and its management. Especially visitors to the area must be sensitised about visiting rules and restricted access as well as about alternative offerings to facilitate a non-intrusive but authentic WH experience.

Criterion 4.2: All stakeholders are educated and sensitised about the value and management of European (WH) Beech Forest.

Besides creating awareness on the specific CP and its management, outreach and education activities must equally target the values of European beech and other old-growth forests in general - for example, their important function for human well-being and sustainable development in Europe. The resulting need of protection and necessary management regulations must be appropriately communicated to create understanding and support by a broad range of actors including local stakeholders as well as national and international actors like visitors, Ministries or politicians. Diverse and targeted formats of education must be chosen to reach out as far as possible.

Criterion 4.3: Stakeholders and local actors support and are involved in integrative CP management.

For effective CP management, the active participation and constructive engagement by the full range of local and regional stakeholders in CP management and governance is essential. The active support and self-motivated interpretation of management goals and implementation by local and regional stakeholders but also by further relevant actors, takes this a step further and makes CP management even more solid. That means that stakeholders organise, develop and implement their activities in a manner that does not harm CP integrity and BZ functionality[4] and that regional stakeholders around the CPs contribute actively to the long-term maintenance of the site's Outstanding Universal Value[5].

By their participation and constructive engagement in CP management and governance local stakeholder demonstrate a certain understanding for, appreciation of and interest in the values and management requirements of the CP, its BZ and beyond. On the other hand, reluctance or a lack of participation (of certain or of all stakeholders) can be a sign of general disapproval of the WH status, the protection regime and resulting management strategies. It can also indicate ignorance on participative management and governance processes by stakeholders or a certain inappropriateness of the participation formats offered.

[4] Compare BEECH POWER Strategy for conflict management in buffer zones of WH Beech Forests (O.T2.2)

[5] Compare BEECH POWER Governance strategy I – Activating and involving regional stakeholders in participatory planning processes (O.T1.1)

3.3.5. Principle 5: Management fosters community well-being in a framework of ecosystem-based regional sustainable development.

Giving natural heritage a function in the life of the community and supporting local communities and regional sustainable development in the vicinity of WH sites are important requirements set by the WH Convention and related policies[6]. This might seem to stand in conflict with the non-intervention policy for WH BF CPs and related land-use limitations and development options that have been excluded by strict conservation regulations. However, WH sites and their surrounding regions are considered model sites also for sustainable development, i.e. rural and community development. The special situation of the serial site makes the implementation of this requirement especially difficult since there are several regions and therefore many different settings connected with the WH site. In order to fully comply with this requirement, CP managers of the serial site must work together and support each other with regard to this topic.

At the same time, it must be underlined that with its supportive and beneficial function, the CPs with their WH status can play a central role for and catalyse regional sustainable development. CP management can and must contribute to the well-being of local communities and to the creation and equitable sharing of benefits arising from the WH status. It is obliged to foster community development and well-being besides engaging communities in the process of CP management (i.e. stakeholder participation).

Certain regulations and restrictions set by strategic CP management may initially be perceived as barriers to regional development. For some communities and local land users, protection regimes and restrictions for land and resource use in the BZ surrounding a strictly protected WH CP can pose a major challenge in terms of their well-being and livelihoods, especially in case of recently designated areas. WH sites should not restrict or compromise the well-being of local communities but help to maintain or increase it. No one should be left alone dealing with possible changes in the organisation of local life resulting from the WH status and this is why appropriate support must be given to those in need, even if it is only initially or for a short time. Hence, the potential of the CP to contribute to community well-being and sustainable regional development must be fully explored, adequately used and appropriately acknowledged and communicated.

On the one hand, WH CPs may sustain biological and cultural diversity and provide ecosystem services and other benefits, which may contribute to the quality of life and well-being of communities concerned (UNESCO 2021) and are the essential basis for a regional sustainable development. Management should therefore recognise the close links and interdependence of biological diversity and local cultures within the socio-ecological system of WH property as well as the fundamental role of CPs for the resilience of communities strengthening the ability to resist, absorb and recover from effects of natural hazards and climate change. This focus on the local scale also has high global relevance. It is important to integrate the WH CPs into a wider framework of ecosystem services and human well-being targets.

On the other hand, through their WH status and their Outstanding Universal Value CPs can function as catalysts for regional sustainable development by adding value, deepening the attachment and identification of the local population with the region, strengthening local pride, and also making the region more attractive for visitors and other sympathetic actors. Supporting community development can contribute to the creation of regional ownership of and shared responsibility for the WH site. Targeting human and community well-being is a means of improving the development of communities and reducing negative influences on CPs at the same time. Ecosystem-based regional sustainable development also means dealing with influences from the surrounding landscape matrix on the CP without losing the focus of human well-being. Therefore, management of the CP should acknowledge the broader socio-economic and socio-

[6] Compare: UNESCO World Heritage Convention (1972), Policy for the integration of a sustainable development perspective into the processes of the World Heritage Convention (2015), The “Five Cs” (strategic objectives) of the WHC as defined in Decision CONF 202 9: Budapest Declaration on World Heritage (2002) and Decision 31 COM 13B: The “firth C” (2007)

cultural value and context of the property accounting for the impact of strategies and management activities on the local community.

Fostering sustainable development is not only a task to be pursued by individual CPs but also on the serial site as a whole. Here the focus is slightly more generally laid on sustainable development in Europe. Therefore, the cooperation, support and joint effort amongst WH BF component parts can enhance and facilitate regional sustainable development contributing to holistic sustainable development. As a first step, (neighbouring) WH BF component parts could partner up to pursue a common vision and collaborative approach actively supporting each other with regard to regional sustainable development, for example by the exchange of knowledge and concrete experience or with developing community partnerships. Raising awareness of sustainable regional development requirements associated with WH sites is essential for all CPs and the serial site as a whole.

It must also be acknowledged that not only CPs of the serial WH site but all European beech forests and old-growth forests are important core pieces for a sustainable development in Europe and must be included in joint efforts and knowledge exchange.

Criterion 5.1 Ecosystem services that are essential for the well-being of local people are sufficiently provided and accessible to all

Although managed by a non-intervention and process protection approach, the CP can play an important role for the well-being of local communities and their sustainable development. The CP provides essential ecosystem services for local and regional human well-being, above all functional services like climate regulation or water purification, but also contributes to local spirituality, a sense of home, local pride and traditions. WH CP areas support a range of ecosystems services that are essential for local well-being and are the vital basis and crystallisation cores for a sustainable regional development. Not only the CP but also the ecosystems in the BZ and in the surroundings of WH CPs provide, transfer and support essential ecosystems services for local well-being. The kind and intensity of land use as well as the landscape structure have an influence on which ecosystem services will be provided to what extent. The WH status especially protects the provision of some services, mainly regulatory services, but the strict protection may also restrict access to other services, particularly provisional and partially cultural services for local people. This holds especially true for the BZ and, in some cases, for the ecosystems of the surrounding landscape. CP management must ensure that ecosystem and land use management around CPs provide for essential ecosystem services contributing to the well-being of local communities and the wider region. Those ecosystem services that cannot be accessed in protected areas must be provided by other ecosystems in the near vicinity or the wider region around the CP and made accessible to local communities (e.g. wood resources, food, recreation). Especially other forests play an important role for regional sustainable development as they can supplement the provision of regulating but also other ecosystem services.

Criterion 5.2 Human well-being of the local population is enhanced by additional contributions resulting from the WH status and integrative component part management.

The WH CP supports local and regional human well-being not only by providing essential ecosystem services. It can also play a role in additional contributions to community well-being and socio-economic development in the surroundings of the CP. This includes regional added value and other socio-economic benefits for local communities and the wider regions (Courrau et al. 2006). CP management is expected to support generating and maintaining such additional contributions, i.e. regional added value such as alternative income and employment, new business ideas, regional products or an additional image for tourism. The WH status may increase the range of those additional contributions to the well-being of the local population. CP management must ensure that its potential is fully used to catalyse regional sustainable development.

Criterion 5.3 Additional benefits and added value generated through the WH status are equitably shared amongst stakeholders without compromising anyone's well-being.

CP management must ensure that regional added value and other (socio-economic) benefits and opportunities for sustainable development as well as for human well-being in general arising from the WH status of the CP are generated and shared equitably with and between local and regional stakeholders. No community, stakeholder group or individual must be excluded from benefit-sharing or even harmed in favour of other beneficiaries. For example, land use must be equitably organised (UNESCO 2021) without favouring a specific group of land users like for touristic infrastructure. Furthermore, any benefit generated or value created must not compromise human well-being, both locally and elsewhere. Regional businesses might be supported by refocusing to be more sustainable and to act in alignment with the values for the serial WH site.

Criterion 5.4 Regional actors are capable of (regional) sustainable development and actively contribute to it.

In order to contribute to, participate in and to drive sustainable regional development, local communities and associated actors need sufficient capacities in various terms, e.g. knowledge, skills, finances, partnerships, personnel. It partially lies in the responsibility of integrative CP management to encourage and support communities to identify needs and increase appropriate capacity, as well as to contribute to a regional discussion process on intended developments and to engage in cooperative activities among themselves and with CP management.

4. Practical application of the CQM

The CQM can find practical application in at least three ways:

1) as guidance for integrative CP management planning,

2) facilitating the evaluation of management effectiveness of individual CP (clusters)

3) promoting the exchange of knowledge and experience between CPs of the serial WH BF site.

Those functions are three potential entering points into a continuous process of applying the CQM in WH BF CP management (Figure 2 and 3).

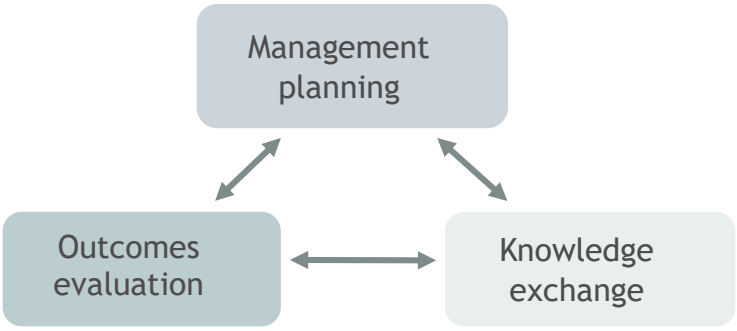

Figure 2: The three functions of the Code of Quality Management.

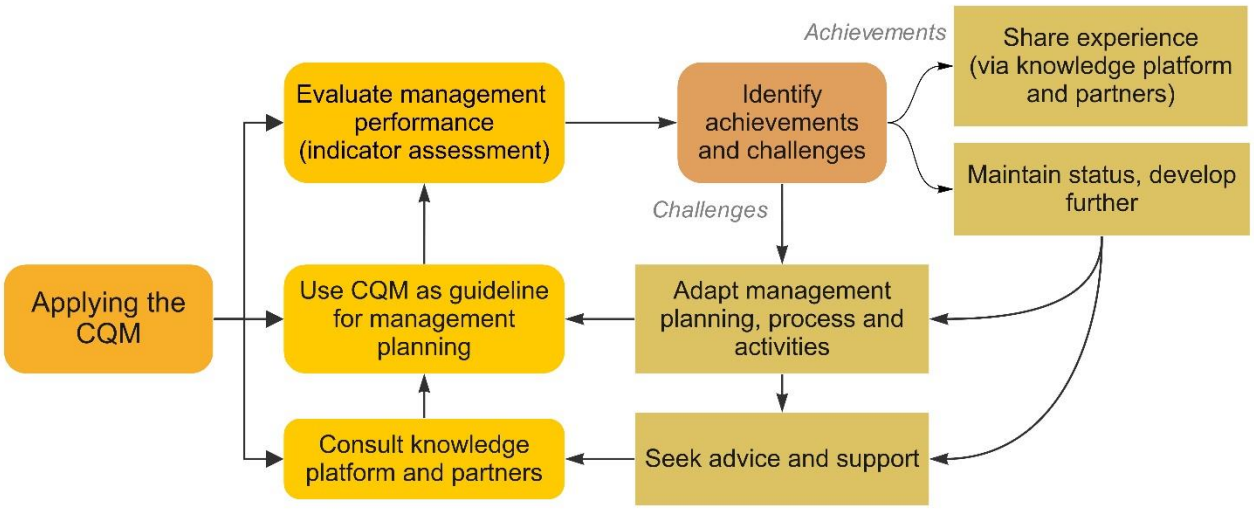

Figure 3: Continuous application process of the CQM with the three main functions as potential entering points.

4.1. Guidance for management planning

The main function of the CQM is to guide integrative management planning of WH BF CPs and to ensure high quality management outcomes. The principles and criteria for quality management provide the basic framework for goal and target setting in management planning for WH BF CPs. Since the principles and criteria have to be fulfilled to reach high quality CP management, they must be adequately reflected in the goals and targets of the strategic management planning of the CP (cluster).

The CQM can guide initial planning as well as adapting existing management plans. The CQM can help to ensure that all WH BF CPs set similar goals and targets in management planning and concentrate on those most relevant for meeting the requirements for WH sites set by the WH Convention and Operational Guidelines as well as the policies associated to that. Of course, how those goals and targets are then pursued in individual CPs might differ due the very diverse area and institutional settings throughout the serial site. For developing concrete approaches, strategies and activities, the various strategies and guidelines generated in the BEECH POWER project can give further guidance. The *BEECH POWER Strategy for the improvement of management quality in the project target areas (O.T3.1)* provides a good starting point referring to other strategies where applicable.

First steps of applying the CQM could be either to check, whether all principles and criteria are sufficiently addressed in the management goals and targets of existing management plans, or to use the principles and criteria as a basic framework to guide management planning in the first place. The CQM can inform and enrich every-day conservation work without having to go through a comprehensive assessment every time.

4.2. Evaluation of management outcomes – an assessment tool

In order to evaluate the effectiveness of CP management it is highly recommended to conduct an effectiveness assessment using the CQM. The principles and criteria of the CQM hereby provide the basic framework for the assessment.

Each specific criterion must comprise at least one indicator to enable the evaluation in how far each principle has been reached on each of the management effect levels. A set of indicators is provided in the

appendix. As the indicators have to account for many different CPs with diverse management settings they can only cover a certain level of detail. They can and should be subject to changes and adaptations as new knowledge is gained. The concrete measurements and verifiers will have to be selected and applied by those who evaluate a management situation and will depend on the available and accessible data and information. The accuracy of assessment might therefore vary between different applications (both in time in one CP and with regard to different CPs), but should become more consistent with the further development of the serial WH site, common management standards and a common monitoring system. A fixed assessment protocol nevertheless ensures a high level of transparency and comparability between different assessments.

4.2.1. Assessment process

The most probable and practical way to assess the management effectiveness of a WH BF CP (cluster) is in form of a self-assessment, be it assisted by experts and partners or not. It is therefore recommended to carefully plan the assessment process beforehand. Before starting the assessment, aspects like the assessment team, assessment scope and the inclusion of stakeholders and other partners have to be clarified.

4.2.1.1. Organise assessment team

For a comprehensive and robust assessment, it will be beneficial to conduct the assessment in an interdisciplinary team with diverse background, knowledge and expertise rather than by a single person to capture diverse perspectives and perceptions on integrative CP management. Team members might be managers of the protected areas associated to the WH BF CP (cluster), but also other actors involved in CP management or taking some kind of responsibility in it. External partners like managers of other CPs of the serial WH site or colleagues from neighbouring protected areas could complement the team. This would enrich the discussions and create a collective learning effect at the same time.

4.2.1.2. Define assessment scope

In order to facilitate a reliable assessment of the indicators, the respective reference areas must be defined. It is possible to assess a single CP or a CP cluster depending on the geographical and administrative setting. A cluster of several neighbouring CPs can be combined for the assessment provided it is managed by the same entity.

The distinction of the CP and BZ should be quite clear since their delineation is officially defined.

The definition of the surrounding landscape matrix (LM) is a more difficult exercise. However, if strategic management is applied for the CP, the definition of the management scope is one of the first steps. Basically, the LM should comprise the area that is directly affected by the CP and its management and that also affects or may affect CP integrity and CP management in turn. This can include several more or less neighbouring landscape forms, ecosystems and land use types as well as diverse groups of stakeholders with their places of residence and spaces of action.

4.2.1.3. Include stakeholders and relevant actors

In order to get a comprehensive picture of the management results on several effect levels it is highly recommended to include relevant stakeholders and actors in the evaluation process or at least for individual indicator assessments. This includes local stakeholders like land users, local administrations, NGOs, land owners or agencies as well as external partners. Before starting the process and probably several times within the process relevant stakeholders have to be identified.

4.2.2. Assessment protocol

The assessment protocol includes several aspects and questions to be answered in order to evaluate management effectiveness of a WH Beech Forest CP and to transparently document the evaluation process for better understanding and higher comparability.

Summary of the current situation

For each indicator a short summary of the current situation serves as the basis for the evaluation, as reference for the rating as well as for documentation. This summary should already take into account the two dimensions of each indicator reflected in the guiding questions.

Rating

All indicators are scored on a scale of 1 to 4, with 1 being the highest score indicating high management quality and 4 being the lowest score for low management quality. The rating can be awarded in two ways:

1) Direct rating

The score 1-4 is directly assigned for each indicator without further consultation of guiding questions. Because this rating is less robust the level of confidence will have to be reduced by one.

2) Gradual assessment using guiding questions

For a more precise evaluation, better comparability and transparency the guided assessment is recommended. For each indicator there are two guiding questions – one examining the scope dimension and one the intensity dimension of each indicator. The scope dimension reflects how wide-ranging or extensive the indicator is. The intensity dimension measures how severe, how strong the indicator is pronounced. Each guiding question is answered by itself generating two sub-ratings on a four-level-scale. For each guiding question there is orientation guidance provided in the appendix suggesting distinct values for ratings 1-4. These two intermediate values are then offset against each other to generate the main rating (see Figure 4 and 5).

	1	2	3	4
1	1	2	2	3
2	2	2	3	3
3	2	3	3	4
4	3	3	4	4

Figure 4: Generation of the indicator rating from the two sub-ratings

Score	Assigned management quality	Need for action
1	high	No additional action needed; maintaining the current condition
2	medium	Action recommended; enhancing the current condition
3	low	Action required; revision of the current condition
4	very low	Action urgently required; reversal of the current condition

Figure 5: Interpretation of indicator scores in terms of management quality and need for action

Decision base and justification

In order to better understand and classify the validity and expressiveness of the rating, it is important to document the decision base and the reasons for the rating. This includes all information and processes on the basis of which the rating was assigned. What specific data and verifiers were used? What existing data was consulted? What extra data was collected? What methods were used? Who carried out the assessment? Which stakeholders and actors were consulted and involved? To what extent were there different views and how were they dealt with? This is especially useful for comparisons either with other CPs or with earlier or later assessments of the same site.

Level of confidence

Depending on the reasoning of the rating and how detailed the assessment process was, the robustness of the rating score assigned can differ. A quick assessment by a single person would tend to be less robust than an extensive assessment process with detailed data and/or consultation with different stakeholders and experts. Therefore, it is recommended to indicate the robustness of the assessment or the level of confidence on a scale from 1 (not confident, hardly robust) to 3 (very confident, robust decision; compare Table 2). This can be particularly helpful in comparing this assessment with previous assessments or with other areas.

Table 2: Definition of the level of confidence in the CQM assessment protocol.

Score	Level of confidence	Applicability
1	low	No concrete data is available or has been consulted for assessment. AND The assessment was made by one person/entity alone or is based on one opinion.
2	medium	No or insufficiently clear data could be used as a basis. OR The assessment was made by only one person alone or by one entity with the same opinion.
3	high	The assessment was made on the basis of robust data and agreed with several other persons or entities or stakeholders. OR The assessment is supported by unequivocally documented evidence (e.g. camera images).

Knowledge base

It is recommended to shortly document the available knowledge base for each indicator. What kind of knowledge and data do exist? How good is the knowledge base? Are there any knowledge gaps or deficits? This information can become helpful when measures are applied, e.g. to find out research topics, knowledge gaps, content for projects etc. It is possible to apply a four-level-scale (1=weak knowledge base, 4=strong knowledge base) additionally or instead of a summary in words.

Ideas for action

During the assessment of each indicator, first ideas for possible actions may emerge. It would be useful to record those thoughts. This might help deriving approaches for action in order to fulfil the criteria.

4.2.3. Evaluating and interpreting assessment results

Cumulative rating

From the indicator ratings, several cumulative scores can be derived. This can inform the process of management adaptation in different ways.

(1) Effectiveness per criterion

Calculation	Rating / Need for action	Purpose
Average of all respective indicator ratings per criterion	1: 1 – 1.4 2: >1.4 – 2.4 3: >2.4 - 3.4 4: >3.4 - 4	→ identification of criteria-specific achievements and deficiencies → adjustment of action fields and management processes

(2) Effectiveness per principle

Calculation	Rating / Need for action	Purpose
Average of scores from all indicators of one principle	1: 1 – 1.2 2: >1.2 – 2.2 3: >2.2 – 3.2 4: > 3.2 - 4	→ identification of principal achievements and deficiencies → adjustment of action fields and management processes

(3) Overall effectiveness

Calculation	Rating / Need for action	Purpose
Average of all scores	Absolute score rounded to one decimal place 1-4	→ comparison with other assessments (either same area and different time or different CPs)

Achievements and challenges

From the results – both individual indicator results as well as cumulative results – current achievements and deficiencies of integrative CP management can be derived. Lower ratings indicate achievements and higher

ratings deficiencies of management. This can give indication on strengths and weaknesses of current CP management.

Necessities and options for action

Higher scores imply a greater need for action. For criteria and principles with higher scores, management goals, strategies and/or individual actions need to be revised and adapted to the findings. The guiding questions for indicator rating help to interpret the specific situation and to find concrete starting points for the adaptation of management strategies and measures. The *BEECH POWER Strategy for the improvement of management quality in the project target areas (O.T3.1)* can help to identify and allocate strategic actions and concrete measures by providing objectives, strategic actions and specific activities for improving integrative CP management.

4.3. Knowledge generation and exchange

The CQM confronts those responsible for WH BF CP management with a wide range of criteria for quality management. It is very likely that managers have not yet dealt with some of these criteria in detail for varying reasons. The CQM provides guidance for management planning and can also help identify achievements and strengths as well as challenges and potential for improvement of CP management. Resulting findings may motivate managers to seek for assistance and support, to ask other CP managers for their experiences and approaches and to share their own success stories with the wider Beech Forest community. Thus, the CQM plays an important role in initiating, maintaining, shaping and guiding the exchange of knowledge and experiences between the CPs. It can help identify and define needs and interests for specific topics of joint research, capacity building, staff exchange and visits, or other forms of cooperation.

The BEECH POWER project developed an online knowledge exchange platform with the aim of improving and operationalize knowledge sharing among management teams of CPs, including stakeholders and entities involved at the local, regional, national (e.g. public authorities) and WH BF site level (e.g. JMC, Coordination office). A first draft of this knowledge exchange platform is attached to a MS Teams folder, which is managed by the site's Coordination Office. Its structure is based on the theoretic approach of the CQM as well as on the *BEECH POWER Strategy for the improvement of management quality in the project target areas (O.T3.1)*. The knowledge platform allows involved parties to share any information regarding their management, research, communication etc., and to learn about related approaches and data from other CPs. The access can be granted via the WH BF Coordination Office.

5. Glossary

Buffer zone	Officially delineated protection zone surrounding the official WH CP.
Component part	Officially designated World Heritage Beech Forest area.
Component part cluster	A group of neighbouring component parts within the same country administered and managed by the same entity (in most cases).
Criteria	Conditions that need to be met in order to comply with a principle.
Ecological integrity	The term “integrity” is used in the basic WHC documents and requirements and reflects very high ecosystem functionality. Integrity is a measure of intactness; integer systems are functional. Integrity of a WH site or CP is part of the OUV, which needs to be maintained.
Ecological functionality	The operational state of ecosystems characterized by inherent structures, processes, functions and dynamics that provide ecosystems with both the necessary (energetic, material and hydric) efficiency and resilience to function effectively without (abrupt) alteration to system properties or geographical distribution during periods of external change. Ecosystems develop greater functional efficiency when they harbour more biomass, contain more information, and are organized more complexly with a high degree of connectedness among the system’s elements (Freudenberger et al. 2012, Ibisch & Hobson 2014, Ibisch 2019).
Ecological stress	An ecological stress describes the impaired status of a key ecological attribute (KEA) in an ecosystem. Any variation of a KEA that would ultimately lead to the degradation or loss of the biological target can be considered a stress (Ibisch & Hobson 2014, Schick et al. 2019).
Indicators	Measureable states that allow the assessment of whether or not a particular criterion has been met.
Integrative component part management	Integrative component part management takes into account the regional context as well as the nested systems in which the CP is embedded. It accounts for the effect the surrounding landscape matrix has on the component part including ecological processes as well as threats and opportunities arising in the wider landscape. Integrative management acknowledges at least five spatial and thematic contexts, where management takes effect: the component part itself, the buffer zone, the surrounding landscape matrix, the serial WH BF site, and the European beech forest ecosystem.
Key ecological attribute (KEA)	Aspect of a conservation target's biology or ecology that, if missing or altered, would lead to the loss of that target over time (Ibisch & Hobson 2014, Schick et al. 2019).
Knowledge partnership	Cooperation with one or more actors (e.g. research institute, NGO, university, government agency) focusing on the generation, sharing, exchange, communication and documentation of knowledge of a certain topic.

Landscape matrix	The regional context in which the component part with its buffer zone is embedded. It includes the wider landscape surrounding the CP. The concrete scope depends on the specific landscape structure, the types and sizes of ecosystems, human land-use and other activities as well as on ecological processes relevant to the integrity of the CP. Any source of threats or opportunities arising in the wider landscape that may affect CP integrity must be included in the consideration of the landscape matrix.
Principle	Fundamental statement about a desired outcome.
Strategic management	Strategic management can be considered as the ongoing planning, monitoring, analysis and assessment of all necessities a component part needs to achieve the overall goal of maintaining its integrity and the OUV of the serial WH site as well as the detailed objectives reflected in the principles and criteria of the Code of Quality Management.
Stress	→ ecological stress
Threat	A disturbance that causes a negative change of key ecological attributes and stress in a biological or ecological system (Ibisch & Hobson, 2014).

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7. Appendix - Indicators (assessment guide)

Principle 1 Management prioritises ecological functionality of the component part and the embedding ecosystems.

Criterion 1.1 There are no negative impacts of human activities on the CP.

Indicator 1.1.1: Degree of human-induced ecological stress in the CP

CP BZ LM WH EU

This indicator can be considered the core indicator for management effectiveness since the main goal of CP management is to protect CP integrity and the OUV of the site. Ecological integrity means that there is no disturbance by humans to be observed. If there is, management is not effective. An ecological stress describes the impaired status of a key ecological attribute (KEA) in an ecosystem. Any variation of a KEA that would ultimately lead to the degradation or loss of the biological target can be considered a stress[1,2]. A comprehensive overview on KEAs and potential ecological stresses is provided by Schick et al. (2019)[2;] an overview of climate change-induced stresses is provided by Geyer et al. (2011)[3]. Both lists can serve as references or checklists for assessing this indicator. Any kind of observed surprising, spontaneous or local ecological change could be considered a stress. In this indicator only ecological stress caused by human intervention at some point is included. Here the occurrence of the observed change itself is assessed, not the occurrence of its cause. Human activities are considered separately in subsequent indicators. Frequent kinds of stress are trampling, damaged vegetation, compacted or damaged soil, reduced biomass or increased tree mortality. This separation of stress and threat (human activities causing the stress) is important since not all human activities necessarily cause stress in an ecosystem and there might be ecological stress that cannot be connected to a known human activity and must be investigated more.

Scope: What proportion of the area of the CP is affected by human-induced ecological stress?

1	<1%
2	1-5%
3	5-10%
4	>10%

Intensity: How severe is the impact on the affected area?

1	low	There is no reduction of overall functionality.
2	moderate	There is a certain reduction of overall functionality expected within the next 10 years.
3	high	There is a recognisable reduction of overall functionality.
4	very high	There is a serious reduction of overall functionality.

[1] Ibisch, P. L., & Hobson, P. R. (2014). MARISCO. Adaptive MAnagement of vulnerability and RISk at CONservation sites. A guidebook for risk-robust, adaptive and ecosystem-based conservation of biodiversity. Eberswalde: Centre for Econics and Ecosystem Management.

[2] Schick, A., Porembski, S., Hobson, P. R., & Ibisch, P. L. (2019). Classification of key ecological attributes and stresses of biodiversity for ecosystem-based conservation assessments and management. Ecological Complexity, 38, 98-111. doi:10.1016/j.ecocom.2019.04.001

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Indicator 1.1.2: Human activity in the CP

CP | BZ | LM | WH | EU

This indicator complements the preceding one by exploring human activity in the CP – both legal and illegal – which should be at an absolute minimum for the sake of CP integrity. Here the concrete human intervention is considered regardless of its impact on CP integrity. Even if certain human activity in the CP does not show any negative impact it might do so in future.

Scope: On what proportion of the CP area does human activity take place?

1	<2%
2	2-5%
3	5-10%
4	>10%

Intensity: How intense is this human activity?

1	gentle	Occasional, sporadic access
2	moderate	Frequent access
3	serious	Occasional, low-level biomass extraction
4	severe	Frequent, high-level biomass extraction

Indicator 1.1.3: Degree of human impact/activity in the BZ that affects or may affect the CP

CP | BZ | LM | WH | EU

This indicator draws the direct connection between human activity in the BZ (which is allowed to a certain extent) and resulting stresses in the CP. An example might be the opening of the crown cover by timber harvesting in the BZ causing edge effects like windfalls or microclimatic changes in the CP. Another example is the expulsion of deer from the BZ into the quiet CP due to increased visitor numbers or noise level causing higher rates of browsing in the CP.

Scope: On what proportion of the BZ area does human activity take place?

1	<10%
2	10-30%
3	30-60%
4	>60%

Intensity: How strong is the degradation effect of this human activity on CP integrity?

1	mild	degradation unlikely, short-term disturbance
2	moderate	certain degradation
3	serious	likely degradation
4	heavy	most-likely, long-term degradation

Criterion 1.2 The component part is ecologically supported by functional ecosystems in which it is embedded.

Indicator 1.2.1: Degree of human-induced ecological stress in the BZ

CP | **BZ** | LM | WH | EU

The degree of ecological functionality of the BZ is very important with regard to CP integrity. The lower the functionality in the BZ, the more likely are negative impacts on the CP and its integrity. Functionality is reduced by ecological stress. An ecological stress describes the impaired status of a key ecological attribute (KEA) in an ecosystem. Any variation of a KEA that would ultimately lead to the degradation or loss of the biological target can be considered a stress. A comprehensive overview on KEAs and potential ecological stresses is provided by Schick et al. (2019)[4]; an overview of climate change-induced stresses is provided by Geyer et al. (2011)[5]. Both lists can serve as references or checklists for assessing this indicator. Any kind of observed surprising, spontaneous or local ecological change could be considered a stress. In this indicator only ecological stress caused by human intervention at some point is included. Here the occurrence of the observed change itself is assessed, not the occurrence of its cause. Human activities are considered separately in further indicators. Frequent kinds of stress observed in the BZ include damaged vegetation, compacted or damaged soil, reduced biomass (such as living or dead wood) or increased tree mortality. Ecological stress may give indication of inappropriate ecosystem management both within the BZ and in the surrounding landscape. The CP may be used as a reference area to assess unflavoured ecological changes in the BZ, i.e. ecological stress.

Scope: What proportion of the BZ area is directly or indirectly affected by human activity in the BZ or beyond?

1	<10%
2	10-25%
3	25-50%
4	>50%

Intensity: How severe is this impact on BZ functionality?

1	mild	no reduction of overall functionality
2	moderate	certain reduction of overall functionality within next 10 years
3	serious	recognisable reduction of overall functionality
4	heavy	severe reduction of overall functionality

[4] Schick, A., Porembski, S., Hobson, P. R., & Ibisch, P. L. (2019). Classification of key ecological attributes and stresses of biodiversity for ecosystem-based conservation assessments and management. Ecological Complexity, 38, 98-111. doi:10.1016/j.ecocom.2019.04.001

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Indicator 1.2.2: Ecosystem management in the BZ

CP | **BZ** | LM | WH | EU

The intensity and frequency of ecosystem management in the BZ has an influence on the functionality of the respective ecosystems and therewith on their buffering capacity for safeguarding CP integrity. Regardless of the types of ecosystem considered here, a lower degree of human intervention will make the effectiveness of the BZ in buffering negative impacts more likely.

Scope: What proportion of the BZ is actively managed/used?

1	<10%
2	10-20%
3	20-30%
4	>30%

Intensity: How intense is the management/use?

1	mild	rare use, slight modification
2	moderate	extensive use, moderate intervention, noticeable modification
3	serious	intensive use, strong intervention, clear modification
4	heavy	very intensive use, very strong intervention, highly transformative

Indicator 1.2.3: Forest condition in the BZ

CP | **BZ** | LM | WH | EU

In order to fulfil a buffering function, the ecosystems in the BZ must have a certain degree of ecological functionality. Apart from wetlands and water bodies, forests provide the best buffering potential due to their resemblance with the ecosystem to be protected within the CP. Forest ecosystems with high functionality, i.e. a low degree of human intervention, are prone to have a very high buffering function.

Scope: What proportion of the area of the terrestrial ecosystems in the BZ is forested?

1	>90%
2	80-90%
3	70-80%
4	<70%

Intensity: Of what condition is the forest in the BZ?

1	natural	Without use for more than 30 years, similar to forest in CP
2	slightly changed	Some changes from the past, very light current changes, light infrastructure
3	modified	Structural and biological changes, infrastructure, modified species composition
4	heavily altered	Complete change of species composition and forest structure, heavy infrastructure

Indicator 1.2.4: Human activity or intervention in the surrounding landscape matrix

CP BZ **LM** WH EU

Human activities in the landscape surrounding the CP and its BZ can reduce the ecological functionality of the LM by directly changing ecosystem structure and abundance, by changing the landscape structure or by intervening ecological processes. This way, they can have negative impacts on CP integrity, sometimes over longer impact chains or with delayed effect. The assumption is that a higher degree of human activity in the LM raises the potential for negative impacts on CP integrity. This indicator explores the degree of such human intervention in the LM related to agriculture, forestry, infrastructure development, settlements, recreational activities or industry, for instance. It looks both at the proportion of the area affected by human intervention as well as the intensity of land use.

Scope: What proportion of the surrounding landscape matrix is actively managed/used by humans?

1	<25%
2	25-75%
3	75-90%
4	>90%

Intensity: How intense is human activity where it occurs in the LM?

1	mild	Extensive forest management, non-motorised recreational activities
2	moderate	Extensive agriculture, intensive forest management, light infrastructure
3	serious	Intensive agriculture, local infrastructure
4	heavy	Settlement, heavy infrastructure, excavation

Indicator 1.2.5: Forest condition in the LM

CP BZ **LM** WH EU

This indicator asks for the area and functionality of forests in the surrounding landscape matrix. Functional forest area in the surrounding of the CP can help to protect CP integrity. In turn, absence of forest in the landscape matrix or intensive forest management may cause negative impacts on CP integrity due to deficient connectivity, reduced regional climate and water regulating capacity and stronger edge effects, for example.

Scope: What proportion of the surrounding LM is forested?

1	>75%
2	50-75%
3	25-50%
4	<25%

Intensity: How intense is forest management in the LM?

1	unused
2	Hardly used
3	Extensive use
4	Intensive use

Indicator 1.2.6: Permanent vegetation in non-forested areas

CP | BZ | LM | WH | EU

Not all area can be covered by forest. However, to ensure a certain level of ecological functioning in non-forested areas, permanent vegetation is an important asset. The quantity and quality of the existing permanent vegetation is explored in this indicator. Permanent vegetation includes green structures that remain in their place throughout the year and are not harvested, ploughed or otherwise displaced, e.g., meadows, permanent crops, shrubs, trees, perennial herbaceous plants, hedges etc. Higher quantity and quality of those support CP integrity better.

Scope: What proportion of the non-forest area of the LM is covered by permanent vegetation?

1	>50%
2	25-50%
3	5-25%
4	<5%

Intensity: What is the quality of that permanent vegetation?

1	near-natural	Near-natural vertical green structures with high biological and structural diversity, e.g. hedges, shrubbery, unmanaged grasslands
2	slightly changed	Occasionally maintained vegetation with some vertical green structures with low biological and structural diversity, e.g. orchards, short-rotation coppice
3	modified	Hardly or moderately maintained low vegetation with single vertical green structures, e.g. grasslands, pastures
4	heavily altered	Heavily maintained low vegetation without or hardly any vertical green structures, e.g., meadow, lawn

Indicator 1.2.7: Forest condition in the next higher administrative spatial unit

CP | BZ | LM | WH | EU

This indicator shall help to give a sample overview on the degree of forest ecosystem functionality in Europe; it explores how much functional forest is left in Europe. It is based on the assumption that ecological functionality decreases with increasing management intensity and is highest in unused forests. As reference area the terrain of the next higher relevant administrative unit, that contains relevant forest areas including beech forest or other old-growth forest, is chosen.

Scope: What proportion of the area of the next higher administrative spatial unit is forested?

1	>50%
2	25-50%
3	5-25%
4	<5%

Intensity: Of this forested area, how much is covered by unused or hardly managed forest?

1	>30%
2	15-30%
3	5-15%
4	<5%

Criterion 1.3 The component part is ecologically connected to other beech forests

Indicator 1.3.1: Degree of ecological connectivity of the CP with nearby beech forests

CP BZ LM WH EU

Additional to the general ecological functionality of the landscape surrounding the CP, this indicator aims at the concrete ecological connection between the CP with other beech forests. In order to avoid misunderstandings and misinterpretations and for better assessment of management effectiveness itself instead of geographic preconditions, it is recommended to rather consider at least three nearby beech forests that are not separated from the component part by major natural barriers such as large crossing rivers or high mountain ranges. For this indicator, concrete ecosystems connecting addressed beech forests are in focus. Here, connectivity is considered a measure of landscape structure and functionality, incorporating the hardness of barriers, the connectedness of natural cover, and the arrangement of land uses not focussing on the specific needs of single species but rather on the undisturbed course of ecological processes like regeneration and succession, seed dispersal, species and individual migration or pollination. Factors that decrease ecological connectivity include intensive land use and the resulting decrease in forest, and other vertical green structures like riparian strips or hedges, as well as the connected increase in physical barriers like highways, settlements and urban areas, fences or excavation sites. The connection corridor to be considered must be chosen with a sense of proportion in accordance with the geographical conditions. For example, if there is a swamp or lake between two forests, the corridor considered for the assessment must be chosen large enough to include the shore and adjacent ecosystems. The same holds for a single mountain or a small mountain range – lower surrounding areas must of course be taken into account, even if they are not the shortest connection between two forest areas.

Scope: What proportion of the connecting landscape between the CP and the three nearest beech forests (without major natural barriers) supports ecological connectivity?

1	>75%
2	50-75%
3	25-50%
4	<25%

Intensity: How well is ecological connectivity supported by the landscape structure and ecosystem properties in those areas?

1	Very well supported	Full connectivity, e.g. natural, free-willed and/or self-developing terrestrial ecosystems with high functionality like connected forest
2	Well supported	Mainly natural ecosystems with single surmountable human-induced obstacles
3	Reasonably supported	Connection supported by continuous ecological structures around human-dominated ecosystems
4	Poorly supported	Existence of single ecological stepping stones within a landscape of highly managed ecosystems

Principle 2 Management ensures a supporting legal, regulatory and institutional framework.

Criterion 2.1 Integrative CP management complies with existing legal and institutional provisions.

Indicator 2.1.1: Compliance of management with the requirements of the BZ Guidance Document for the official CP area

CP | BZ | LM | WH | EU

The coordination office of the serial WH BF site has prepared a guidance document on buffer zone management and buffer zone zonation for the site's component parts. This document was endorsed by the Joint Management Committee in 2021. It contains specifications on permitted activities in the official CP that must be followed.

Scope: On what proportion of the official CP area does land use not currently meet the requirements of the Buffer Zone Guidance Document?

1	<1%
2	1-5%
3	5-10%
4	>10%

Intensity: How many requirements of the BZ Guidance Document are currently violated in the official CP area?

1	0
2	1
3	2-3
4	>3

Indicator 2.1.2: Compliance of BZ management with the requirements of the BZ Guidance Document

CP | BZ | LM | WH | EU

The coordination office of the serial WH BF site has prepared a guidance document on buffer zone management and buffer zone zonation for the site's component parts. This document was endorsed by the Joint Management Committee in 2021. It contains specifications on permitted actions, land use regulations and zonation in the official BZ that must be followed.

Scope: On what proportion of the BZ area does land use not currently meet the requirements of the Buffer Zone Guidance Document?

1	<1%
2	1-5%
3	5-10%
4	>10%

Intensity: How many requirements of the BZ Guidance Document are currently violated in the BZ?

1	0
2	1
3	2-3
4	>3

Indicator 2.1.3: Compliance with site-specific WH BF requirements (according to Reactive Missions, Periodic Reporting, WHC decisions etc.)

CP BZ LM **WH** EU

Besides the general WH requirements, there is a range of requirements related to its status as UNESCO World Heritage that are specific to the serial WH BF site, such as decisions of the World Heritage Committee (WHC), reporting obligations within Periodic and Reactive Reporting or reactive missions following WHC decisions. Usually, the serial site's coordination office takes over the transmission of the requirements to the component parts and initiates and assists their implementation. Component part managers are obliged to cooperate and to implement the requirements. This indicator asks for the number of pending demands and the severity of impact on the management and OUV of the site.

Scope: How many specific WH BF requirements (according to Reactive Missions, Periodic Reporting, WHC decisions etc.) does CP management not comply with?

1	0
2	1
3	2-3
4	>3

Intensity: How severe are the consequences of non-compliance?

1	no consequences	
2	mild consequences	e.g., mild consequences for the component part
3	moderate consequences	e.g., serious consequences for the component part
4	severe impact	e.g., consequences for whole serial WH site

Criterion 2.2 The legal and institutional framework positively supports the strategic management of the component part complex.

Indicator 2.2.1: Presence of legal framework conditions for the CP that may have negative impacts on CP management

CP | BZ | LM | WH | EU

The existence of a strict protection regime for the CP is assumed for all component parts since this a prerequisite for inscription as WH site. However, regulations and their enforcement can change to the disadvantage of CP protection. It lies in the responsibility of CP managers to ensure this strict protection and avert negative changes. Despite the strict protection, there may be additional regulations for the CP that might conflict with it or might bear negative impacts on the CP such as specific regulation related to forestry, species protection or disaster management.

Scope: How many legal framework conditions for the CP have or may have negative impacts on CP integrity and management?

1	0
2	1
3	2-3
4	>3

Intensity: How severe are those negative impacts for CP management and integrity?

1	mild	low impact (little area and/or hardly disturbing)
2	moderate	moderate impact (moderate area and/or disturbing)
3	serious	severe impact (large area and/or degrading)
4	heavy	very severe impact (very large area and/or destructive)

Indicator 2.2.2: Presence of legal framework conditions for the BZ that may have negative impacts on the CP or contradict integrative CP management goals

CP | BZ | LM | WH | EU

The existence of an appropriate protection regime for the BZ is assumed for all component parts since the designation of an official BZ is a prerequisite for inscription as WH site. However, regulations for the BZ and their enforcement might not be sufficient to ensure the achievement of integrative CP management goals and CP integrity. The interpretation of BZ management might differ greatly between individual component parts or respective State Parties. Further, regulations might change compromising the buffering function of the BZ. It lies in the responsibility of CP managers to ensure an adequate delineation and protection regime for the BZ and to avert negative changes in order to reach integrative CP goals. Besides possible deficits in the delineation and protection of the BZ, there may be additional regulations concerning the BZ that might conflict with integrative CP management goals such as specific regulations related to forestry, species protection, disaster and pest management or regional development.

Scope: How many legal framework conditions for the BZ have or may have negative impacts on CP integrity and management?

1	0
2	1
3	2-3
4	>3

Intensity: How severe are those negative impacts for CP management and integrity?

1	mild	low impact (little area and/or hardly disturbing)
2	moderate	moderate impact (moderate area and/or disturbing)
3	serious	severe impact (large area and/or degrading)
4	heavy	very severe impact (very large area and/or destructive)

Indicator 2.2.3: Presence of legal framework conditions in the LM that may have negative impacts on the CP or contradict CP management goals

CP BZ **LM** WH EU

In order to avoid or reduce negative impacts on CP integrity originating in the LM, the appropriate regulation of land use and other human activities are of great importance. Although there seems to be no official means of action for CP managers with regard to the LM in most cases, CP managers must make sure that legal framework conditions related to land use and human activity in the LM support the goal achievement of integrative component part management. The legal framework should bear as little conflict and contradiction with integrative CP management goals and implementation approaches as possible. Potential conflicts can arise with regulations connected to a broad range of topics like regional planning, disaster management, the protection of certain species or habitats, forestry, agriculture or infrastructure development.

Scope: How many legal framework conditions for the surrounding LM have or may have negative impacts on CP integrity and management?

1	0
2	1
3	2-3
4	>3

Intensity: How severe are those negative impacts for CP management and integrity?

1	mild	low impact; little area affected and/or hardly disturbing effect
2	moderate	moderate impact; moderate area affected and/or disturbing effect
3	serious	severe impact; large area affected and/or degrading effect
4	heavy	very severe impact; very large area affected and/or destructive effect

Indicator 2.2.4: Legal protection status of ecosystems in the LM

CP BZ **LM** WH EU

A legal protection regime aims at protecting or restoring ecological functionality of ecosystems. Hence, any protection regime for ecosystems in the LM can support their functionality reducing negative impacts on CP integrity. There are different kinds of protection with differing protective strength. The more and the better ecosystems in the LM are protected from human intervention to a certain degree, the fewer negative impacts there might arise on CP integrity.

Scope: What proportion of the surrounding LM is legally protected?

1	>75%
2	50-75%
3	25-50%
4	<25%

Intensity: How strictly is the respective area protected?

1	Very strict	process protection, strict protection (e.g. National Park, IUCN I-III)
2	Rather strict	preservative protection (e.g. nature reserve, Natura 2000, IUCN IV-V)
3	Reasonable	sustainable land use, extensive (landscape park, nature park, Biosphere reserve, IUCN VI)
4	Rather weak	other protection, management restrictions only

Indicator 2.2.5: Requirements of WH BF site-specific documents and provisions that contradict CP management goals

CP BZ LM **WH** EU

This indicator describes how well and adequately frameworks and agreements on JMC and State parties level such as the Integrated Management System capture the management conditions and needs of component parts. It explores to what agree there might be conflicts or contradictions that do not sufficiently support or even impede appropriate management of the component part.

Scope: How many requirements of WH BF site-specific documents and provisions stand in conflict with or contradict strategic CP management goals to maintain CP integrity?

1	0
2	1
3	2-3
4	>3

Intensity: How severe are those inconsistencies for CP management and maintaining CP integrity?

1	mild	hardly any impact noticeable or expected
2	moderate	minor impediment of strategic CP management, minor discrepancy with CP management goals
3	serious	noticeable interference with strategic CP management goals
4	heavy	major contradiction with CP management goals, impedes strategic CP management

Indicator 2.2.6: Protection status of beech forests and other old-growth forests in the next higher relevant administrative unit

CP BZ LM WH EU

This indicator shall help to give a sample overview on the legal protection situation of beech forests in all of Europe and the corresponding development. As reference area the terrain of the next higher relevant administrative unit, that contains relevant beech forest or other old-growth forest, is chosen. The respective administrative area must be suitable to reflect this sufficiently. The indicator encompasses any kind of legal protection for beech or old-growth forests that help to maintain their ecological functionality and integrity.

Scope: What proportion of the beech forests or other old-growth forests in the next higher relevant administrative unit (e.g., district, province, federal state, state) are legally protected or have adequate management restrictions?

1	>75%
2	50-75%
3	25-50%
4	<25%

Intensity: What kind of protection does the applicable forest have?

1	Very strict	process protection, strict protection (e.g. National Park, IUCN I-III)
2	Rather strict	preservative protection (e.g. nature reserve, Natura 2000, IUCN IV-V)
3	Reasonable	sustainable land use, extensive (landscape park, nature park, Biosphere reserve, IUCN VI)
4	Rather weak	Other kinds of protection, or management restrictions only, (e.g., certified wood production, recreational forest, protection forest)

Principle 3 Management generates, maintains and develops a supporting knowledge base

Criterion 3.1 Those involved in integrative CP Management have (access to) sufficient and adequate knowledge, expertise and skills to make profound management decisions.

Indicator 3.1.1: Deficit of knowledge on beech forest ecology and development

CP BZ LM WH EU

Since it is difficult to judge the extent of available knowledge, the focus is on identified deficits of knowledge with regard to beech forest ecology and development. It is important to find out what kind of knowledge is missing or insufficient in order to inform management planning properly and to make profound management decisions. It is also relevant how important that knowledge is and what decisions are impeded to what extent.

Scope: What is the extent of the knowledge deficit with regard to beech forest ecology and development*?*

1	Low	No deficit, sufficient knowledge present and accessible
2	Moderate	Few aspects lacking
3	Serious	Several aspects lacking
4	Heavy	Whole topic is deficient

Intensity: How much does this deficit impede profound management decisions and actions?

1	Not	No impact
2	Lightly	Acceptable uncertainty, decision-making hardly affected
3	Moderately	Major uncertainty, with certain restrictions on decision-making
4	Heavily	Inability to decide and act

Indicator 3.1.2: Deficit of knowledge on BZ management requirements for WH beech forests.

CP **BZ** LM WH EU

Since it is difficult to judge the extent of available knowledge, the focus is on identified deficits of knowledge on the functioning and management requirements of WH BF buffer zones. It is important to find out what kind of knowledge is missing or insufficient in order to inform management planning properly and to make profound management decisions. It is also relevant how important that knowledge is and what decisions are impeded to what extent.

Scope: What is the extent of the knowledge deficit with regard to BZ management requirements for WH beech forests?

1	Low	No deficit, full knowledge present and accessible
2	Moderate	Few aspects lacking
3	Serious	Several aspects lacking
4	Heavy	Whole topic is deficient

Intensity: How much does this deficit impede profound management decisions and actions?

1	Not	No impact
2	Lightly	Acceptable uncertainty, decision-making hardly affected
3	Moderately	Major uncertainty, with certain restrictions on decision-making
4	Heavily	Inability to decide and act

Indicator 3.1.3: Deficit of knowledge and skills with regard to the impacts of the surrounding landscape on CP management

CP BZ **LM** WH EU

Since it is difficult to judge the extent of available knowledge, deficits in the knowledge and skills with regard to the present and potential impacts of the surrounding landscape on the CP need to be identified and acknowledged. It is important to find out what kind of knowledge or abilities are missing or insufficient in order to inform management planning properly and to make profound management decisions. It is also relevant how important that knowledge is for what kind of decision.

Scope: What is the extent of the knowledge deficit with regard to the impacts of the surrounding landscape on CP management?

1	Low	No deficit, full knowledge present and accessible
2	Moderate	Few aspects lacking
3	Serious	Several aspects lacking
4	Heavy	Whole topic is deficient

Intensity: How much does this deficit impede profound management decisions and actions?

1	Not	No impact
2	Lightly	Acceptable uncertainty, decision-making hardly affected
3	Moderately	Major uncertainty, with certain restrictions on decision-making
4	Heavily	Inability to decide and act

Indicator 3.1.4: Deficit of knowledge and skills with regard to approaches and requirements for sustainable regional development

CP BZ **LM** WH EU

Rather than the extent of available knowledge, which is difficult to evaluate, the focus shall be laid upon identified deficits in the knowledge and skills with regard to approaches and requirements for sustainable regional development. It is important to find out what kind of knowledge and skills are missing or insufficient in order to inform and implement management planning properly and to make profound management decisions. It is also relevant how important that knowledge is for what kind of decisions or implementation.

Scope: What is the extent of the knowledge and skills deficit with regard to approaches and requirements for sustainable regional development?

1	Low	No deficit, full knowledge present and accessible
2	Moderate	Few aspects lacking
3	Serious	Several aspects lacking
4	Heavy	Whole topic is deficient

Intensity: How much does this deficit impede profound management decisions and actions?

1	Not	No impact
2	Lightly	Acceptable uncertainty, decision-making hardly affected
3	Moderately	Major uncertainty, with certain restrictions on decision-making
4	Heavily	Inability to decide and act

Criterion 3.2 Knowledge of different sources and formats is applied in integrative CP management to support planning and decision-making.

Indicator 3.2.1: Existence and use of knowledge partnerships with local or regional stakeholders and actors

CP BZ LM WH EU

A knowledge partnership can be considered a regular cooperation with one or more actors (e.g. research institute, NGO, community authority, hunting association) focusing on the generation, sharing, exchange, communication and documentation of knowledge of a certain topic. Here the focus is on knowledge partnerships on a local or regional level, supposedly concentrating on area-specific knowledge and management requirements, but not exclusively.

Scope: With how many local or regional stakeholders and actors has the CP entered a knowledge partnership?

1	>3
2	2-3
3	1
4	0

Intensity: How intense are the current knowledge partnerships with local or regional partners?

1	Lively	Frequent and intense exchange
2	Regular	Frequent consultation, occasional exchange
3	Occasional	Occasional consultation or exchange
4	Inactive	No active consultation of exchange

Indicator 3.2.2: Existence and use of knowledge partnerships with national and international partners

CP BZ LM WH EU

A knowledge partnership can be considered a regular cooperation with one or more actors (e.g., university, government agency, research institutes, Ministry) focusing on the generation, sharing, exchange, communication and documentation of knowledge of a certain topic. Here the focus is on partnerships on the national and international level implying handling of more general knowledge on (beech) forest ecology, restoration and management.

Scope: With how many national and international actors has the CP entered a knowledge partnership?

1	>3
2	2-3
3	1
4	0

Intensity: How intense are the current knowledge partnerships with national and/or international partners?

1	Lively	Frequent and intense exchange
2	Regular	Frequent consultation, occasional exchange
3	Occasional	Occasional consultation or exchange
4	Inactive	No active consultation of exchange

Criterion 3.3 CP management contributes to collaborative generation, management and dissemination of knowledge on European beech forests and their management.

Indicator 3.3.1: Degree to which the component part is integrated in and contributes to multilateral knowledge management activities on forest ecology, restoration and management

CP BZ LM WH EU

This indicator describes in how far component part managers are involved in and contributing to joint knowledge generation, exchange, documentation and distribution within and beyond the serial WH BF site with regard to forest ecology, restoration and management. This includes the participation in joint research activities together with representatives from other component parts, the participation in thematic working groups, the exchange of knowledge and best practice with other component parts and any other activity that adds to the goal of increasing the knowledge base for adequate WH BF management. It also includes the cooperation with managers of other beech forest or old-growth forest areas in Europe, with research institutes, universities or agencies.

Scope: In how many topics is the component part integrated in and contributes to multilateral knowledge management activities on forest ecology, restoration and management?

1	>5
2	3-5
3	2-3
4	<2

Intensity: Which role does the component part play within these activities?

1	Major	Lead partner and/or initiator
2	Important	Active collaborator
3	Relevant	Active supporter
4	Minor	Passive supporter

Indicator 3.3.2: Degree to which knowledge on beech forest ecology, protection, restoration and management is actively distributed and shared with others

CP BZ LM WH EU

Not only the generation and documentation of knowledge on beech forest ecology, protection, restoration and management is important for effective management, but also its dissemination amongst relevant target groups enhances management effectivity. Form and format of the knowledge and its dissemination can be

diverse reaching from scientific publications and reports over brochures and websites to lectures and courses. Different channels and media might be used in order to reach a large group of different recipients.

Scope: How many addressees does the disseminated knowledge reach?

1	Many	Several large groups of recipients
2	Several	Large group or several small groups of recipients
3	Few	Small group of recipients
4	Very few	Individual recipients

Intensity: How far does the impact force of the disseminated knowledge reach?

1	International	Recipients of other countries
2	National	Recipients of the same country
3	Regional	Recipients in the wider vicinity of the CP, those who live in the region affected by the CP
4	Local	Recipients in the near vicinity of the CP, those who are directly affected by management

Principle 4 Management creates a high level of understanding, appreciation & support of the WH BF component part by stakeholders and other actors

Criterion 4.1 Stakeholders understand, accept and respect management goals and corresponding regulations of integrative CP management.

Indicator 4.1.1: Degree of illegal human activity and violation of rules in the CP and BZ

CP BZ LM WH EU

Illegal or undesirable human activities in the CP and BZ can give indication in how far relevant stakeholders sufficiently understand, appreciate and support the values and management requirements for the protection of the component part. If legal or other binding provisions for the CP and BZ are violated, it can be assumed that those involved are lacking understanding, appreciation or respect for the component part. Common illegal or undesirable human activities include trespassing, damage or removal of vegetation, soil or other natural assets, vandalism or littering.

Scope: How often do rule violations and illegal activities currently occur in the CP and BZ?

1	rarely	very seldom, 1-2 every few months at maximum
2	occasionally	1-2 within a few weeks
3	often	several within a few weeks
4	permanent	very frequent

Intensity: How strong is the violation of rules?

1	Mild	Entering per foot, walking through, no extraction, no stay
2	Moderate	Mushroom picking, low-level camping/bivouac
3	Serious	e.g., camping with fireplace; extraction of plants, small wood or animals; littering
4	Heavy	e.g. wood or soil extraction, motorised entering, building & construction, poaching, waste disposal

Indicator 4.1.2: Degree of conflict with or among stakeholders regarding strategic goals of integrative CP management

CP BZ LM WH EU

Conflicts can be a sign of unmet needs and a feeling of exclusion on the side of specific stakeholders or of systemic lacks like unbalanced decision-making or aspects of unfair distribution. Often conflicts arise or are intensified by lacking communication and cooperation with or amongst stakeholders. It is one task of integrative CP management to avoid or resolve conflicts before escalation at a low level (between management and stakeholders) in a productive and constructive manner. Conflicts could arise about ecosystem management of the BZ and the surrounding landscape matrix, for example.

Scope: How many different stakeholder groups have been involved in conflicts that emerged within the last 3 years?

1	None or hardly any
2	Few
3	Several
4	Most

Intensity: How severe have these conflicts been?

1	Mild	There is hardly any impact on CP management.
2	Moderate	CP management has to deal with the conflicts.
3	Serious	CP management is hampered by the conflicts.
4	Heavy	CP management is severely hindered by the conflicts

Criterion 4.2 All stakeholders are educated and sensitised about the value and management of (WH) European Beech Forest.

Indicator 4.2.1: Educational and communication outreach focussing on the serial WH site in the last 3 years

CP BZ LM WH EU

This indicator targets the serial aspect of the WH BF site and the role component parts they play therein. It is important to communicate that individual component parts are part of a greater entity with a joint management approach and that they share and complement a set of values attached to European beech forests that need to be safeguarded. The indicator explores the range of recipients targeted to communicate and educate on this specific aspect as well as the weight of the topic in outreach activities.

Scope: How many stakeholder groups has CP management targeted by education and communication outreach focussing on the serial WH site in the last 3 years?

1	All
2	Most
3	Some
4	None / hardly any

Intensity: Which role has the topic of the serial WH site played in educational and communication outreach in the last 3 years?

1	Very well	Overarching major topic
2	Reasonably	Important individual topic
3	Insufficiently	Important subtopic
4	Weakly	Minor subtopic

Indicator 4.2.2: Educational and communication outreach with regard to the value and management of European beech forests in the last 3 years

CP BZ LM WH EU

WH BF component parts represent the European beech forest ecosystem. With their outstanding value and condition they form the benchmarks of beech forest ecosystem development and protection in Europe within the serial WH site. Connected with this representative status is the special mission to appreciate and protect the beech forest in Europe accordingly as a whole. The importance of European beech forest and their protection must be appropriately reflected in educational and communication outreach of each component part by offering different formats and addressing diverse target groups. Aspects targeted in education and outreach could include the role of beech forests and other old-growth forests in landscape ecology, important ecosystem services they provide and their resulting role for human well-being.

Scope: How many different formats to educate about the value and management of European beech forests has the CP offered in the last 3 years?

1	>3
2	2-3
3	1
4	0

Intensity: How far did these offers extend to reach recipients?

1	Far	Local and beyond
2	Fairly far	Mostly local, but occasionally beyond
3	Not far	Occasionally local
4	Not at all	None

Criterion 4.3 Stakeholders and local actors support and are involved in integrative CP management.

Indicator 4.3.1: Performance of stakeholder involvement in integrative CP management

CP | BZ | LM | WH | EU

This indicator shall show how successful CP management activities have been to reach and involve stakeholders in management processes. The goal is that all stakeholder groups are equally participating in CP management and governance processes and participants represent the full diversity and range of stakeholders. Further, a high level of stakeholder incorporation in management and decision-making processes is important to avoid conflicts, to gain acceptance and support.

Scope: For how many stakeholder groups have appropriate formats for regular participation been offered in the last 3 years?

1	All
2	Most
3	Some
4	None / hardly any

Intensity: How strongly are stakeholders intended to be engaged?

1	Strongly	empowerment, decision power
2	Reasonably	dialogue, contribution, consultation
3	Moderately	hearing, placation
4	Minimum	information

Indicator 4.3.2: Commitment of relevant stakeholder groups and local actors in participation processes

CP | BZ | LM | WH | EU

This indicator asks how intensely and frequently local stakeholders make use of opportunities and fulfil their obligations of participating and contributing in management planning, decision-making and monitoring with regard to integrative CP management. The nature and manner of their contributions and their readiness for compromises give an indication of their basic understanding and appreciation of the values and management requirements connected to the CP, BZ and LM. It is also important to evaluate what kind of stakeholders are engaging in what manner and if all stakeholder groups are contributing equally.

Scope: What proportion of relevant stakeholder groups have been committed in participation processes in the last 3 years?

1	All
2	Most
3	Some
4	None / hardly any

Intensity: How intense has their commitment been during that time?

1	Strong	regular, reliable, constructive, by own motivation
2	Reasonable	frequent, active
3	Moderate	occasional but constructive or passive
4	Weak	occasional but mostly opposing

Indicator 4.3.3: Local projects and initiatives supporting integrative CP management and strategic goals

CP BZ LM WH EU

This indicator asks for the motivation and commitment of local actors to support integrative CP management as an indicator for their understanding and supporting the values to be protected. This can include activities or initiatives that are organised or spontaneous, voluntary or remunerated, agreed or self-dynamic, continuous, regular or occasional. They can range from financial support over assistance in events to offering regular services in a visitor centre, for example. It is beneficial to reflect what kind of activities or initiatives there are and what impact they have on CP goals achievement.

Scope: How many supporting projects or initiatives have there been in the surrounding of the CP in the last 3 years?

1	Many
2	Few
3	Single
4	None

Intensity: How beneficial have those projects been for CP management?

1	Very beneficial	highly supportive, actors take over management tasks, continuous active involvement in management
2	Reasonably beneficial	continuous complementary and/or supporting activities
3	fairly beneficial	temporary complementary or supporting activities
4	Somewhat beneficial	occasional supporting activities

Principle 5 Management fosters community well-being in a framework of ecosystem-based regional sustainable development.

Criterion 5.1 Ecosystem services that are essential for the well-being of local people are sufficiently provided and accessible to all.

Indicator 5.1.1: Perceived constrains to human well-being and the access to essential ecosystem services

CP BZ LM WH EU

Although component part integrity is the main goal of integrative component part management, it should not compromise local human well-being. Most component parts and their surroundings provide at least some essential ecosystem services for the well-being of the local population. However, due to management restrictions connected to the protection regime, CP and BZ cannot provide all necessary ecosystem services for local human well-being. Those must then be provided by other areas. This holds especially for provisioning services such as food or materials. Further, demand and access to ecosystem services might not be equal amongst all local stakeholders. One sign if the well-being is compromised by CP management is by asking local people for constrains they perceive in connection with CP management. It is important to differentiate between a true constrain for human well-being and a certain standard of living, for example. It is also important to critically reflect the access to different kinds of essential ecosystem services and their importance for local human well-being. Some services might seem to stand in conflict with each other in the eyes of some stakeholders, such as timber production and some regulating services. This indicator shall help to reflect not only the supply situation for local well-being but also the acknowledgement of important (regulating) ecosystem services by the local population.

Scope: What proportion of the local population feel constrained in their well-being and/or their access to essential ecosystem services?

1	<25%
2	25-50%
3	50-75%
4	>75%

Intensity: How constrained do affected people feel?

1	hardly	hardly affected
2	fairly	somewhat restricted
3	much	seriously stressed
4	very much	existentially threatened

Criterion 5.2 Human well-being of the local population is enhanced by additional contributions resulting from the WH status and integrative CP management

Indicator 5.2.1: Additional benefit for the well-being of the local population resulting from the WH status and integrative component part management

CP BZ LM WH EU

Apart from the provision of essential ecosystem services by the CP, additional benefits can be created using the WH status in order to support sustainable regional development. In this indicator the extent of this additional benefit, including new sources of local income, environmental education programmes for local schools or the marketing of local products for example, is explored.

Scope: What proportion of the local population see an additional benefit for their well-being by the WH status?

1	>75%
2	50-75%
3	25-50%
4	<25%

Intensity: How great is the additional benefit that is perceived by local people?

1	Very beneficial	enriching
2	Reasonably beneficial	supplementary
3	fairly beneficial	supporting
4	Somewhat beneficial	not perceived, at least not disturbing

Indicator 5.2.2: Use of the World Heritage status for regional sustainable development

CP BZ LM WH EU

The WH status is supposed to support regional sustainable development in the region where the CP is located. This indicator explores in how far the WH status is really used to enhance development. This underlines the idea, that the WH status generates benefits for WH regions that would not necessarily arise without it and that this potential is comprehensively explored and used.

Scope: In what proportion of the projects aimed at regional development is the WH status taken up as an opportunity?

1	Most
2	Some
3	Few
4	Hardly any

Intensity: What role does the WH status play in those projects who take the WH status up?

1	Major	decisive role
2	Important	reinforcing role
3	Relevant	supportive role
4	Minor	Rather irrelevant role

Criterion 5.3 Additional benefits and added value generated through the WH status are equitably shared amongst all stakeholders without compromising anyone's well-being.

Indicator 5.3.1: Perceived inequity in benefit sharing by the local population

CP BZ LM WH EU

Generating additional benefits for the region where the CP is located is one important aspect of regional sustainable development. However, regional development can only be considered sustainable if benefits arising from the WH status of the CP are shared equitably and no-one is or feels excluded, disadvantaged or even negatively affected by those benefits. For example, touristic offers by external providers like a hotel chain or a travel agency may not generate any benefit for the local population or even outperform local offers. This indicator tries to capture the degree of satisfaction or dissatisfaction of the local population with regard to their share in the benefits created by the WH site.

Scope: What proportion of the local population feel inequitably treated in sharing the benefits of the WH status?

1	<25%
2	25-50%
3	50-75%
4	>75%

Intensity: How strongly do people feel affected by inequity?

1	Hardly	Affected people feel included but not benefitting
2	Somewhat	Affected people feel disadvantaged
3	Much	Affected people feel excluded, neglected
4	Very much	Affected people feel severely impaired

Indicator 5.3.2: Extent to which added values or other generated benefits compromise human well-being (locally and elsewhere)

CP BZ LM WH EU

Although additional benefits are an important asset of regional sustainable development, not all benefits are favourable for all. Regional development can only be sustainable if the benefits created do not have a negative impact on anyone's well-being – be it locally or elsewhere. All added value should enhance human well-being, and must not impede it. For example, touristic infrastructure development around a CP may benefit the local community by creating new jobs, improving mobility or supporting local businesses. At the same time, infrastructure like roads reduces ecosystem functionality of the ecosystems it is embedded in or which it makes accessible. This loss of ecological functionality may have an effect on the provision of ecosystem services essential for certain stakeholders thereby compromising their well-being. Also, the growth in individual motorised traffic increases harmful emissions that may add to global climate change and thereby affect people in other regions of the world negatively. This indicator shall facilitate a critical reflection on the (existing and intended) benefits created in the region through the WH status and CP management.

Scope: What proportion of generated or envisaged benefits (may) compromise(s) human well-being?

1	<10%
2	10-30%
3	30-75%
4	>75%

Intensity: How intensely do those questionable benefits compromise human well-being?

1	Hardly	Only individuals on a local or regional level are affected.
2	Fairly much	There is a compromising impact on single local or regional stakeholder groups.
3	Seriously	Their compromising effect affects the whole region.
4	Heavily	They have a general/global impact.

Criterion 5.4 Regional actors are capable of (regional) sustainable development and actively contribute to it.

Indicator 5.4.1: Cooperation with and between local actors for regional sustainable development

CP BZ LM WH EU

Regional sustainable development is an important mission of WH sites but of course, it is not in the responsibility of CP management alone to implement it. However, one mission of CP management can be to ensure and enhance regional capacity for sustainable development. The degree of cooperation with and amongst local actors like community authorities, civil organisations or regional development agencies can reflect this capacity for sustainable development.

Scope: What proportion of the regional actors are cooperating with each other and CP management with regard to regional sustainable development?

1	All
2	Most
3	Some
4	Hardly any

Intensity: How intense is the contribution by those regional actors?

1	Strong	All actors are collaborating.
2	Reasonable	Those actors have a somewhat supplementary role in the cooperation.
3	Fair	The respective actors are supporting the cooperating project.
4	Weak	Those actors play a rather passive role.