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Editorial

Editorial from the New Editor in Chief, Open Questions and Outlooks for the Future

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I am proud to have accepted the invitation to become the new Editor in Chief of the *Journal of Zoological and Botanical Gardens*, a new open-access journal published by MDPI, dedicated to ex-situ research and the conservation of our planet's biodiversity.

I am grateful for the results of the editorial line launched by my esteemed predecessor, Anna Loy, who I am honoured to have been the successor of since September 2022. The journal is continuing to steadily grow. Since September, 20 papers have been published. Overall, 53 papers have been published this year. Ten Special Issues are open, and we are expecting to publish three more. Next year, our goal will be to publish close to 60 papers. We are aiming to increase the quality, visibility and indices for our journal; on September 26, we applied for Web of Science indexation (WoS).

1. Editorial Line

Our ambition for this journal is to extend its focus beyond the traditional scopes of zoos, aquaria, and botanical gardens by including a holistic approach to the conservation of the fauna and flora of our planet [1]. We will pay attention to all types of bio-conservatories, that is, all types of structures hosting living and non-living specimens' collections (gardens, museums, genetic banks, herbaria, nurseries, faunistic/floristic areas, etc.). We are also interested in research involving possible in-situ interaction.

The conservation of biodiversity, natural resources and territorial management are based on a gradient that ranges from primary systems to secondary systems, including museums, genetic banks, herbaria and botanical and zoological gardens (bio-conservatories, in the broadest sense).

While remaining substantially unchanged, the new editorial line intends to give more space to aspects linked to any type of bio-conservatory structure in the widest sense. More attention will also be paid to methodologies, ethics and conflict and contradiction analysis. We will also place more emphasis on human resources and cultural human heritage values; we will focus on the environment, biodiversity (*Taxa* from all living organisms' kingdoms and their assemblages), conservation (from active to passive management), biology, agronomy, veterinary, palaeontology, biogeography, anthropology, humanities and social sciences (including soil uses, traditional knowledge, the perception of territory and biodiversity and land-use conflicts), pharmacology, biochemistry, horticulture, arboriculture, forestry, architecture, engineering and history.

Therefore, we will pay more attention to places (institutions) as well as personalities who have distinguished themselves in the study and evolution of bio-conservatories, natural sciences, life sciences and environmental sciences. Greater focus is also intended to be placed on social, cultural and historical aspects, as well as on problems, methods, technologies and new proposals for the management of sets of specimens (collections), with the consideration of ethical and deontological issues regarding the health, well-being and dignity of living organisms.

2. Zoological and Botanical Gardens, and Other Bio-Conservatories

The structures that interest us in our journal often have mixed or very varied names, functions and values.

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Obviously, the largest and most historical institutions are often more famous and richer in specimen sets of scientific and cultural value; however, often, even small institutions can house a notable collection of specimens or have great historical value; in addition, a variety of important scientific studies can be carried out in these places.

An example of a large complex of botanical and zoological gardens with exposition galleries is the famous "Jardin des plantes" (meaning plants' garden) within the "Muséum national d'Histoire naturelle" (National Museum of Natural History) in Paris.

Bio-conservatory structures (i.e., botanical and zoological gardens, as well as museums and genetic material banks) are not only places of storage or exhibition, but above all, they are places of research, and they are home to laboratories, with open spaces and/or closed spaces of various types. Normally, their existence, content and activities are ways in which global and/or local diversity can be explored and catalogued, and at the same time, they represent an important aspect of cultural heritage.

The problems caused by the impact of humans are so important that we can define our epoch as the "Anthropocene" [2], an epoch in which man represents one of the phenomena with the largest modifying effects on the Earth and nature [3]. Human activities have determined landforms, water dynamics, pollution, concreting-over, as well as climatic changes and the last mass extinction. Following the nature–Anthropocene gradient, gardens and others bio-conservatory institutions can play a fundamental role.

Bio-conservatories can not only be a place for animal and plants to be housed, but they can also represent a place in which semi-natural (secondary types) and natural habitats (primary types) can be conserved with the creation of areas that are integrated into gardens' surfaces or through exclaves (other detached owned, controlled or associated areas) [4–6].

Bio-conservatories represent an aspect of cultural heritage, and they can also be used to host historical, architectural and artistic works of high importance. An example is the "Orto Botanico di Padova", founded in 1545; it is the oldest botanical garden in the world that is still in its original location, and it represents a UNESCO World Heritage Site [7–9].

Bio-conservatories include areas in secondary succession, even including ruins and other traces of fossil/archaic landscapes. An important example is the "Giardino di Ninfa", located in the municipality of Cisterna di Latina (Italy). In 1921, this garden was created by Gelasio Caetani in an area within the abandoned medieval city of Ninfa. Several ruins remain, which are integrated in the garden or in secondary successions, some of which were restored during the creation of the garden. Some wetlands are conserved or were restored inside. This garden is considered an important environmental, botanical, faunistic and historical site. It contains a protected area, and it was declared a natural monument of the Italian Republic; however, it is also an important case study for land planners and urbanists, who can use it as an example of how ruins and abandoned settlements do not necessarily need to be restructured or reurbanised, but they can be valorised, leaving nature to recover the spaces it has lost. After all, ruins have great charm and important functions in the environment, as sometimes, they can give refuge and shelter to biodiversity, especially in areas with a lack of large trees and old forests. Additionally, they represent an important form of "archaic" or "fossil" landscapes, as they are evidence of the past and land-use history.

Even gardens that are not officially considered "zoological" or "botanical" can have essential conservation and scientific functions, and they can still represent a didactic, emotional landscape and an area of cultural interest.

Bio-conservatories are generally thematic, dedicated to underlining or representing certain precise aspects of nature or biodiversity. For example, a garden with a particular aspect is a "zoological" garden, based on the presence of animals (a zoological theme), including aquatic species (Aquaria), soil/ground-dwelling animals (Terraria) or reptilian creatures (Reptilaria). Similarly, botanical gardens are gardens underlining the botanical aspects, but they can have different themes and therefore different names; for example, "Giardino dei Semplici" (meaning garden of the simples) when dedicated to the cultivation of officinal/medicinal species, an activity derived from monks (simples). Additionally, a

Hortus conclusus is a garden that is historically enclosed by high walls (taller than a person). Alpine gardens, for example, can preserve mountain species, and they are often placed at high elevations; tropical gardens can conserve tropical flora, etc. When gardens have a botanical and agronomical direction, they can be known as "agro-botanical", "horticultural" or "floricultural", etc.

Gardens can be named following their aesthetical style; examples include the "Giardino all'italiana" (Italian-style garden) or the "English garden". "Garden cities" also exist, inspired by the concept of Ebenzer Howerd, and, for example, by the ideas discussed in the so-called "Cenacolo Michettiano" (developed around various figures such as Francesco Paolo Michetti, Gabriele d'Annunzio, Francesco Paolo Tosti and Costantino Barbella). Styles and concepts that perhaps should be re-evaluated more pertain to urbanism, e.g., giving greater consideration to urban green spaces, urban agriculture, urban and peri-urban forests, urban arboriculture, and giving more attention about the use of alien and native species.

Gardens that are not labelled as "botanical" or "zoological" can still be of scientific interest and should be scientifically studied.

A nomenclatural distinction is often made between gardens for flowers and those for vegetables/officinal plants (i.e., see the Italian "Giardino" and "Orto", or the French "Jardin" et "Potager"). Gardens are also differentiated by considering whether woody species are cultivated in them (i.e., Arboretums) and if these woody species are fruit-bearing (i.e., Orchards, Pomaria, etc.), etc.

Often, little attention is paid to these nuances, and middle grounds and circumstances arise in which giving a particular name to a garden becomes difficult. Alternatively, the name of a garden could be given due to other circumstances, such as, for example, historical, geographical, personality or toponymical reasons.

Bio-conservatories in the largest sense can create or reproduce many sets of environments, from fantasy environments to scenarios made from horticultural species (*Taxa* that would not exist in nature or specifically selected by man), and from archaeological or architectural/artistic scenarios to crops/farming types and reproductions of natural formations, favouring more semi-natural and natural dynamics. *Taxa* and specimens can be organised in various ways, according to various themes, and they can be brought together and assembled to represent formations that can be traced in nature [10]. After all, gardens made for plants can become an important place for fauna to exist [11], and zoological gardens can be places where certain levels of attention and importance could also be given to flora.

Bio-conservatories and related/similar structures can have important roles in specimens' storage, acclimation and exposition, as well as in tourism. These structures have often been used to conserve evidence of scientific and historical/cultural heritage, rarities, curiosities and exotic species (that is, species that were novelties for the time), but also to acclimatise cultivars and new *Taxa* (i.e., new hybrids, mutations and selections) and to experiment with the acclimatisation of *Taxa* in new conditions or in new environments (i.e., [12–14]).

Gardens were once considered as places of cultivation and acclimatisation often dedicated to horticultural species or other exotic *Taxa*, which could then escape, creating problems. Today, following changes in culture and mentality, we pay more attention to native rather than exotic species and therefore to the conservation of endangered species [15]. The functions and content of gardens have both evolved accordingly, with more attention also being paid to the issue of controlling alien species and related problems.

3. Open Questions and Outlooks

Today, we need to further evolve these concepts discussed so far. Alien species should not always be considered a problem, or something always taking the place of native species, because they could also be a resource. "Alien" should not be considered to be a synonym of "invasive", because even native plants can be invasive. "Invasive" is a concept of agronomic

origin which indicates plants that grow very well where they are undesired. Therefore, it is a rather subjective concept, as what is unwanted by one individual may be desired by others. In ecology, they could be considered as plants that have good fitness/adaptability with their environment. The excessive proliferation of species cannot be considered the problem, but rather, an indication of the problem: the excessive anthropisation of the territory, as plants are bio-indicators.

If, on the one hand, the impact of humans has created many problems, on the other hand, it has generated new environments, biological communities and distribution areas for wild species. Alien species enter this system (for better or worse), like how secondary (semi-natural and anthropic) areas have taken the place of more natural areas (for better or worse).

Human impact is not to be considered as negative. Humans have also generated new *Taxa* through selection and hybridisation. If alien species could be perceived as invasive, on the other hand, they allow for the development of the landscape, culture, gastronomy and economy of various territories. This argument therefore remains a very interesting point to evaluate, discuss and work on without fear, hate or biases. It is always very important to think about different aspects of an issue with fewer prejudices. It must also be considered that alien species can be useful for improving natural species, even countering extinction and facing increasing diseases phenomena and facing the climate change (for example, see the improvement of *Vitis vinifera* L. and *Castanea dentata* (Marsh.) Borkh.).

Today, gardens are more commonly conceived of as places where *Taxa* can find refuge from the consequences of human impacts and the effects of climate change. This should not only concern the native species but also the typical genotypes of the territory, even if they belong to non-native species. Even the most synanthropic *Taxa*, or in any case, those that are more closely linked to human presence (i.e., cultural or ruderal) can to find refuge from the consequences of man's land-use abandonment in the most marginal, difficult, distant and uncomfortable areas which are more fully protected or less convenient for humans to exploit.

Various species are known to have gone extinct, for example, among the *Erica* species from Africa, we can mention *Erica verticillata* Forssk. (syn.: *Erica manipuliflora* Salisb.), which is considered an extinct species. However, over time, few specimens have been found to have escaped from plantations in local botanical gardens. Subsequently, other specimens have also been found in other botanical gardens worldwide. This goes to show that species escaping from gardens should not always be considered a problem. *Erica turgida* Salisb. became extinct in the wild in the early 1970s due to the destruction of its habitat through urban planning. This species was later found in a botanical garden. *Erica pyramidalis* Salisb. has been considered an extinct species since the early 20th century due to the destruction of its habitat from the expansion of cities. No ex situ or cultivated plants are known.

Today, gardens are also useful for the conservations of specimens that cannot be reintroduced into the wild, for example, because of the loss of their habitat, or because they belong to non-indigenous and potentially problematic species. Sometimes, animals cannot be introduced into the wild because they are too confident, because of the consequences of a trauma or because they were born in captivity. In any case, this allows specimens to be conserved, and it avoids having to kill or release them if they could create ecological imbalances or if the death/starvation of these individuals is very likely.

The loss of species is an increasingly pressing phenomenon, even in protected areas, despite the utilization of conservation policies and despite the growth of specific environmental and economic programs.

The threats posed to plants are still underestimated (see: [16]) to the point that when we think about species' extinction, animals are generally paid the most attention. A first global analysis showed that in the last 250 years, twice as many plants have become extinct than animals [17]. If we think that plants are very efficient bio-indicators and that they are one of the determining factors of a landscape, the phenomenon of plants' mass extinction is doubly as serious because, in addition to losing plant species, it is also reflected

in the loss/deterioration of habitats, which has negative consequences for all animals, humans included.

The storage of living ex-situ specimens has huge potential in the restoration of habitats, communities and extinct plants [18], and the same could apply to animals.

We also think that, albeit less frequently, collections of non-living specimens could be useful for this purpose. For example, in Herbaria, thanks to the numerous stored collections, sometimes, we can find propagules that are still active (i.e., seeds in herborised samples) [19,20] or other genetic material that could be useful in carrying out studies regarding ancient genotypes or for the consideration of the possible reintroduction of *Taxa*. Similarly, the same could also be possible for other types of non-living collections.

These two last cases contrast remarkably: on the one hand, rare species have likely become endangered due to the collection of specimens; on the other hand, collecting species allows us conserve living specimens or genetic material, to study extinct taxa and even to try to reintroduce them into nature.

For example, until the first half of the 1900s, specimens in nature were being collected at sometimes disastrous levels, even if they were being collected for scientific purposes (especially for plants and insects). Specimens were collected at much higher rates (in terms of quantity and frequency) than what can be conceived today, because in the past, society was very different, with different sensibilities and priorities.

For example, a past common practice was the collection of dozens or even hundreds of specimens per each species, per each population/place. This type of very large-scale specimen collection was often called the "per Centuria" of species.

If we consider that this was carried out by dozens or hundreds of collectors, we understand the possible danger (or the negative influence, at least) that this practice could have had on rare species and on relic/residual populations.

At the time, the strong demand for samples of specimens also encouraged deviant practices that fostered the collection of specimens, fuelling exchanges and trades.

A lot has been done to fix these issues, and a lot has changed since that time; however, there is still a lot to do to increase the sustainability and durability of scientific practices, especially regarding plants.

Today, the conservation of rare or endangered specimens often makes us think of animals and zoological gardens, but there are also examples of plants in botanical gardens, such as the symbolic case of the *Sophora Toromiro* (Phil) Skottsb. from Easter Island (Chile). This species must be mentioned, because it is emblematic of the impact of humans, species extinction, the usefulness of the collection of seed/living specimens/propagules, genetic banks, gardens and the possible difficulties in environmental restoration and the reintroduction of the species. The species is considered extinct in the wild [21], and only a few trees exist today in ex-situ garden/nursery cultivations [22]. *Sophora toromiro* has been recognised as extinct in the wild since its last specimen was felled over fifty years ago. However, the prior collection of seeds allowed its persistence ex-situ. To date, all attempts to reintroduce the species have failed [23], and the reasons for these failures are not yet fully understood. In this regard, for many decades, ad hoc groups have been set up with the aim to manage ex-situ collections to ensure reproduction and to attempt to reintroduce them into nature, starting from the few live genetic individual lines housed in botanical gardens [24]. To maintain this genetic endowment, very interesting experiments have been carried out in attempts to graft samples onto related species [25]. The case of this woody species is so symbolic that it could be compared, for example, with the Białowieża bison (*Bison bonasus* Linnaeus, 1758), which was extinct in the wild and was only conserved in zoos [26]. The species was greatly successful once reintroduced into nature (to the point of being reintroduced in even more central European nations), but it also experienced some initial difficulties, as not all bison were genetically accepted in the first reintroduction program, because they sometimes hybridised with the American bison and cattle [27].

Another important example is *Encephalartos woodii* (Sander 1908), a cycad native to the Ngoye forest in KwaZulu-Natal (South Africa). This species is now extinct in nature [28],

and the only living specimens are preserved in various botanical gardens worldwide. The existing samples of this plant are all only males, being clones of one genotype [29]. This plant species can be compared to the most famous tortoise, "Lonesome George", a male Pinta Island tortoise *Chelonoidis abingdonii* (Günther, 1877) known to have been the last known individual of its species [30]. If its genetic material is well preserved, one day, it will be possible to consider bringing this *Taxa* back to life.

For both of these species, closely related hybrids have been reported, but perhaps one day, due to targeted techniques and decisions, it will be possible to use this genetic material to regenerate both species.

A similar fate also affects *Hyophorbe amaricaulis* Mart., [31], called "the loneliest palm" due to the fact that it is the only remaining specimen of its species. It is preserved in a local botanical garden, the Curepipe Botanic Gardens, in Mauritius. This species risks meeting the same fate as the Dodo (*Raphus cucullatus*, Linnaeus, 1758), and for this reason, a specific conservation program has been set up.

These examples show how *Taxa* extinction not only impacts small and delicate plants, but often affects larger plants such as palms and trees, in every continent on our planet. Often, favourable conditions for a particular species no longer exist in nature because their ecosystems have been destroyed; other times, instead, their reintroduction (if done with the right approach) could be relatively easy [32] under more favourable conditions.

Various changes must be made to the current conservation paradigm. For example, greater attention should be paid not only to native endangered species, but also to lower *Taxa* (including forms, proles, races and varieties, interspecific variations and local typical genotypes), which are decreasingly considered today. We should therefore consider *Taxa* instead of species. We should also consider important, perhaps unique, rare or threatened *Taxa* that may be of non-native or even of artificial (horticultural and cultivar) origin. We should also pay more attention to those *Taxa* that cannot be considered endemic with certainty or with doubtful statuses.

It is crucial that we use this reasoning to avoid the extinction of unique *Taxa* and to prevent very rare *Taxa* from being compromised or threatened, for example, the Thermal Nymphaea [*Nymphaea lotus* f. *thermalis* (DC.) Tuzson] from Romania, which is actually extinct in its original habitat. The remaining Thermal Nymphaea plants are only conserved ex-situ in botanical gardens. The threat to this plant was increased because it was questioned whether this water lily was an introduced rather than a native plant.

Another very contradictory case that shows how we need to change our approach and paradigm is the case of the Sacred Ibis (*Threskiornis aethiopicus* Latham, 1790), which was initially considered a rare expanding animal and therefore was a protected species; later, others considered it to be an invasive alien species because they hypothesised its diffusion occurred following an escape from a zoo.

In the same way, conflicts of opinion arise when unexpected reappearances of locally extinct animals are observed, which some consider as unexplained and "miraculous" returns, while others consider them as animals secretly reintroduced or escaped from farms. The status and consequent management of these animals can change enormously if one or the other option prevails.

We wonder why, sometimes, it is easier to justify presences as escapes from farms than as voluntary and unauthorised reintroductions; why it is easier to allow unauthorised reintroductions rather than authorised reintroductions, and why, in a case like this, are these animals determined to be aliens?

The debate between those who would like to eradicate them because they consider them to not be in their rightful habitat and those who would like to protect them as they have returned to their habitat is always very heated.

Similarly, there is always a very heated debate between those who impose campaigns to eliminate alien species and those who have other visions, especially in the case of animals that can be considered pets (such as dogs and cats) or in the case of animals that are now historical in a territory (for example, goats or mouflons) or linked to particular historical

events (for example, animals that were gifts from kings or other heads of state or animals that are linked to historical personalities, epochs, ancient experiments, etc.). There are plant-related examples, which are similar to the two cases described here, with the same doubts, problems, debates and contradictions. An example is the presence of the black pine (*Pinus nigra* J.F.Arnold) or *Pinus halepensis* Mill. and its historical artificial formations in Italy, which are victims of negative biases and actions which aim to eliminate these species and their artificial historical formations because they are considered by some to be alien species or artificial formations. However, they could be considered by some to be native species (and even strictly endemic) or typical historical cultural formations, similar to secondary meadows and chestnut (*Castanea sativa* Mill.) forests/orchards.

However, it is the—somewhat contradictory—case for many species worldwide that even if they are not native, they are considered to be native because they are "sympathetic", compared to other plants that are instead treated as invasive because they are "unsympathetic". When plants are sympathetic, it has been seen that many efforts are made to demonstrate the dignity of their existence and the necessity of their conservation "at all costs"; in the opposite case, many efforts are made to disvalue unsympathetic plants much as possible and justify why we should not give them the same dignity of existing.

These cases certainly deserve further discussion and insight, and the existence and experience of bio-conservatories can play a very useful role in the search for more appropriate and balanced solutions, with the aim to avoid regretting certain choices in the future that could seem normal and sensible today.

In the past, often, ancient typical *Taxa* disappeared due to excessively drastic political agriculture-related decisions. Just as we regret these decisions today, in the future, we could regret making equally drastic decisions in the current environmental field. For example, today, we regret the treatment of the ancient cow breeds which were typical in France (*cfr*: Ref. [33]). Since the middle of the 19th century, the prevalence of some of these breeds began to decline for endemic reasons (i.e., degeneration and inattention from local farmers). After World War II, many breeds disappeared because of targeted agro-political decisions. Today, some typical breeds remain threatened by extinction (forgotten races). Additionally, other breeds have been saved in extremis, thanks to "resistant" or simply "not diligent" farmers and, fortunately, by lovers of these breeds. Today, we pay more attention to these issues and agro-biodiversity, but much more needs to be done in this regard.

Gardens often host veteran trees and shrubs which are difficult or impossible to find elsewhere due to the negative consequences of human pressure. The examples preserved in gardens can give us insight into the biological potential, structural development and longevity of these species which otherwise, we would not be able to even imagine. In some way, this also may be true for non-vegetal species.

We should pay more attention to the (possible) local extinction of populations, not only because it is an indication of local environment degradation, but also because it can result in the loss of genetic variability and possible *Taxa* extinction. Bio-conservatory activities can be very important in this way through the exploration, description, classification, collection and exhibition of local biodiversity—aspects that are useful to biodiversity conservation as they can be used to inform, raise awareness of and explain biodiversity issues to human society as a whole.

This highlights important cultural phenomena we need to discuss and work on. For example:

- Why is it that today, sometimes, it seems easier to accept the loss (local or total extinction) of *Taxa* rather than the arrival of new *Taxa*?
- Why does it often seem easier to conceive the reintroduction (and population fostering) of animal rather than plant *Taxa*?
- Why does it sometimes seem that the attention to certain taxonomic ranks is now overused/overconsidered when compared to the past, and at the same time, why are other ranks (particularly those below the species) underused/underconsidered? We

must discuss this with regard to the related consequences for protection measures and scientific knowledge.
- How important is it to maintain pure local genetic accessions, and when it would it be nonsensical?

Another set of open questions for which bio-conservatories could be a useful tool are those concerning humans' impact. Often, the impact of humans is so high and persistent that it obscures many other aspects, for example:

- We do not know what the potential vegetation/habitats of some places are.
- We do not know if some *Taxa* are really native to some places or not.
- We should consider how much a taxon may have been favoured or disadvantaged by human presence in a specific area.
- We should consider how much human pressure has modified the distribution ranges of some species.
- We should consider how and from where some *Taxa* have shifted from primary to secondary habitats following the human footprint.

For these reasons, it is beneficial to think about the protection of secondary and primary environments, but also, we should allow for secondary succession (rewilding) in order to understand ecosystem characteristics and dynamics that are unknown today from the perspective of landscape mosaics (conservation/management gradients) facing global changes. In all of this, bio-conservatories can play a strategic role together with protected areas and other similar institutions to form a synergistic system for the conservation of the environment, especially in a context of climate change and socio-economic changes on a global and local scale (global and local changes).

Bio-conservatory structures can play a crucial role in relation to the discussion of contradictions and weak points and circumstances regarding mainstream political and scientific systems. In this regard, educational farms/orchards would also be useful structures for the maintenance of sub-natural/anthropic systems and for the conservation of ancient and modern breeds and varieties (of livestock, flowers, fruits and vegetables), especially the conservation of those that are typical of a territory. Ancient typical *Taxa* are often at risk of disappearing, mainly due to urbanisation, actual agriculture policies' problems, the use of newest *Taxa*, incorrect land management choices or because of increasingly extensive, intensive agricultural practices that are incompatible with such *Taxa* and other traditional landscape elements with a strong human cultural connotation (i.e., of agro-ecological, agro-pastoral, geo-architectural and gastronomical interest), as is the case, for example, for some ancient fruit and vegetables [34].

Bio or bio-agro-conservatory structures are important for the preservation of our agro-heritage, guiding the responsible use of agronomical and natural resources; for the preservation of the memory of traditions; for the conservation of typical proles (i.e., varieties and breeds); for the conservation of secondary vegetation and habitats (active management); and to study/experiment with new uses. This is very important in a changing world, in which we face cultural memory loss, possible climate change and the negative consequences of socio-economic changes.

The same importance should be granted, therefore, to more natural areas, to guarantee habitat restoration/renaturation/secondary succession and primary habitats' preservation, especially in terms of taking care of more anthropofuge (fleeing from man) species and communities.

It is very important to never put species and habitats into competition through personal interests, or radical ideas or drastic solutions. Instead, it is very important to make the effort to seek more balanced solutions. This is increasingly important in land mosaic variation, and we must keep the focus on biodiversity in a world where environmental and ecological issues are increasingly relegated to issues regarding energy transition and CO_2; there is the risk of losing sight of equally important issues or misleading the population about basic concepts of ecology (as it sometimes happens when we hear about electric ecosystems,

military defence ecosystems, resilience, nuclear power, biomass for energy purposes, native and alien species, wildfires, sustainability/renewability, etc.).

We should pay more attention to the precautionary principle. We should always question mainstream ideas, actual policies, actual methods and the concepts in vogue.

Fortunately, we have learned several lessons from our past mistakes. Now, we pay more attention to old plant varieties and old animal breeds. Much has been done to limit and control the exchange of rare wild organisms and to limit wildlife capture. Much has also been done regarding the welfare, health and dignity of animals in captivity, and we pay more attention to alien species.

Surely, much remains to be done in this regard, especially for plants and other organisms dignity, rights and values of which are often underestimated (see, for example, the problems related to forest management, current agriculture policies and virgin biomasses used for energy purposes) [35].

Much needs to be done in terms of nature conservation (of primary and secondary habitats) and secondary successions. Much needs to be done regarding the relationship between nature and man, in favour of biodiversity (and landscape) cultural heritage.

It is important to take the history and evolution of gardens, museums and other bio-conservatories into account. This evolution should concern not only their structures, but also their collections, principles, purposes and techniques.

Beyond the structures, history, collections, research and teaching issues, we must also pay attention to technological, logistic, engineering (structural and infrastructural) and administrative issues which are fundamental for the functioning of bio-conservatory structures. The human capital must also be considered in terms of the workplace, workspaces and the interactions between people involved in the functioning of these structures.

Furthermore, it is also interesting to study the relations of bio-conservatory structures with society and public opinion dynamics, addressing important and crucial philosophical, ideological, ethical and deontological issues, touching on the possible different points of view and the different opinions related, for example, to economics; animalism; environmentalism; the well-being, rights, dignity and health of living collections; and value and management technologies of non-living collections.

A final, very important function that can be performed by bio-conservatories is that of being able to buy areas that can be protected (integral conservation) and to buy—or at least to administrate—areas that can be managed (active conservation), even together with local realities or by supporting and guiding owners in land use. In this way, we can guarantee more a long-term program, and we can eliminate or largely reduce conflicts between managers and local populations, giving value to abandoned land and balancing landowners' efforts towards more adequate soil-use planning (respecting traditional uses and environment) from the perspective of integral conservation and from a mixed perspective by decreasing soil-use pressure and active management.

4. Conclusions

Gardens, museums and other bio-conservatories can finally play a very important role in scientific, societal and cultural progress, conserving an important aspect of human heritage; increasing our knowledge; improving the sustainability of our socio-economic system; enhancing the quality of our cities, countryside and protected areas; and lessening the human footprint (especially on more natural areas).

But, we must be careful that the presence of bio-conservatories never ends up to be the pretext for paying ever less attention to the natural environment, and less attention to the conservation of biodiversity in its natural habitat (in-situ). We cannot allow everything to be left to disappear or be destroyed in nature, because there are bio-conservatories that cultivate or store the species, preserving them to the extinction.

For this reason, the role of environmental education, and the biodiversity issues awareness are crucial initiatives to be performed by bio-conservatories.

There is even a need to pay more attention to the dynamic trends of ecosystems. We cannot allow that land management become a mere use of natural resources, and we must not even allow that conservation become only the natural dynamics tampering. We cannot think only to make active management, to the point of being criticized as mere gardening or breeding activities.

Buying land to be fully conserved or to be managed in a secondary way is also strategic for this purpose, to prevent nature from surviving only in cages or in other exclusively controlled ways.

For these reasons, we need to maintain natural habitats (primary and secondary formations). We need to respect more the primary habitats and the re-naturalization dynamics. We need to be able to guarantee a greater territorial mosaic, paying attention to the presence of secondary habitats where there is a prevalence of primary formations and rewilding; but we should also able at the same time to guarantee portions of primary formations and rewilding where the environment is more sculpted by man.

In conclusion, bio-conservatories and related/similar structures can have a crucial multiple roles for biodiversity and taxa conservation, in a wide sense and in a multimodal way. Nevertheless, a lot depends on precaution principle, on our common sense and our attention.

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References

1. Loy, A. *Journal of Zoological and Botanical Gardens*—Open Access Journal Devoted to Ex Situ Research and Conservation of our Planet's Biodiversity. *J. Zool. Bot. Gard.* **2020**, *1*, 76–79. [CrossRef]
2. Crutzen, P.; Stoermer, E. The "Anthropocene". *Glob. Chang. Newsl.* **2000**, *41*, 17–18.
3. Nebbia, G. L' "uomo" come modificatore della Terra. *Cult. Della Sostenibilità* **2016**, *IX*, 14–20. [CrossRef]
4. Pedrotti, F. (Ed.) *L' orto botanico «Carmela Cortini» dell'Università di Camerino*; Temi: Trento, Italy, 2009; 380p.
5. Pedrotti, F. (Ed.) *La Riserva Naturale di Torricchio 1970–2010*; Temi: Trento, Italy, 2010; 516p.
6. Cianfaglione, K.; Chelli, S.; Campetella, G.; Wellstein, C.; Cervellini, M.; Ballelli, S.; Lucarini, D.; Canullo, R.; Jentsch, A. European Grasslands Gradient and the Resilience to Extreme Climate Events: The SIGNAL Project in Italy. In *Climate Gradients and Biodiversity in Mountains of Italy. Geobotany Studies: 175–186*; Pedrotti, F., Ed.; Springer: Cham, Switzerland, 2018. [CrossRef]
7. Buffa, G.; Bracco, F.; Tornadore, N. *Guida All'orto Botanico di Padova. Quattro Percorsi per Conoscerne la Storia e le Piante*; Centrooffset: Padova, Italy, 1999; 168p.
8. Zaggia, S. *L'università di Padova nel Rinascimento. La Costruzione del Palazzo del Bo e dell'Orto Botanico*; Marsilio editore: Venezia, Italy, 2003; 127p.
9. Schinezos, I.; Cappelletti, E.M.; Cassina, G.; Bertoldo, V. *Hortus Patavinus. Alla Scoperta dell'orto Botanico di Padova*; Input Edizioni: Virtual, 2008; 96p.
10. Pedrotti, F. Il progetto per l'istituzione dell'arboreto dell'Università di Camerino "Arboretum Apenninicum". *L'Uomo e l'Ambiente* **1992**, *15*, 7–16.
11. Petretti, F. *L' Orto Sotto le Mura. Diario di un Naturalista a Camerino*; Oasi Alberto Perdisa: Bologna, Italy, 2006; 114p.
12. Raimondo, F.M. (Ed.) *Orti Botanici, Giardini Alpini, Arboreti Italiani*; Grifo: Palermo, Italy, 1992; pp. 461–466.
13. Bottacci, A. L'arboreto di Vallombrosa. *Nat. Mont.* **2008**, *LV*, 27–35.
14. Gasperini, C. *Gli Arboreti Sperimentali di Vallombrosa. Percorsi Viventi Attraverso la Storia e le Culture*; Compagnia delle Foreste: Arezzo, Italy, 2016; 64p.
15. Bacchetta, G.; Bueno Sánchez, A.; Fenu, G.; Jiménez-Alfaro, B.; Mattana, E.; Piotto, B.; Virevaire, M. (Eds.) *Conservación ex situ de Plantas Silvestres*; La Caixa: Principado de Asturias, Spain, 2008; 378p.
16. Humphreys, A.M.; Govaerts, R.; Ficinski, S.Z.; Nic Lughadha, E.; Vorontsova, M.S. Global dataset shows geography and life form predict modern plant extinction and rediscovery. *Nat. Ecol. Evol.* **2019**, *3*, 1043–1047. [CrossRef] [PubMed]
17. Stokstad, E. Twice as many plants have gone extinct than birds, mammals, and amphibians combined. *Science* **2019**. [CrossRef]
18. Abeli, T.; Dalrymple, S.; Godefroid, S.; Mondoni, A.; Müller, J.V.; Rossi, G.; Orsenigo, S. Ex situ collections and their potential for the restoration of extinct plants. *Conserv. Biol.* **2020**, *34*, 303–313. [CrossRef] [PubMed]
19. Godefroid, S.; Van de Vyver, A.; Stoffelen, P.; Robbrecht, E.; Vanderborght, T. Testing the viability of seeds from old herbarium specimens for conservation purposes. *Taxon* **2011**, *60*, 565–569. [CrossRef]

20. Wolkis, D.; Jones, K.; Flynn, T.; DeMotta, M.; Rønsted, N. Germination of seeds from herbarium specimens as a last conservation resort for resurrecting extinct or critically endangered Hawaiian plants. *Conserv. Sci. Pract.* **2022**, *4*, e576. [CrossRef]
21. Rivera Caniulao, M.; Chaparro, C.B. *Sophora toromiro*. The IUCN Red List of Threatened Species 2021: e.T30392A149811526. 2021. Available online: https://dx.doi.org/10.2305/IUCN.UK.2021-3.RLTS.T30392A149811526.en (accessed on 24 November 2022).
22. Maunder, M.; Culham, A.; Alden, B.; Zizka, G.; Orliac, C.; Lobin, W.; Bordeu, A.; Ramirez, J.; Glissmann-Gough, S. Conservation of the Toromiro Tree: Case Study in the Management of a Plant Extinct in the Wild. *Conserv. Biol.* **2000**, *14*, 1341–1350. [CrossRef]
23. Maunder, M. Conservation of the extinct Toromiro Tree, Sophora toromiro. *Curtis's Bot. Mag.* **1997**, *14*, 226–231. [CrossRef]
24. Püschel, T.A.; Espejo, J.; Sanzana, M.-J.; Benítez, H.A. Analysing the Floral Elements of the Lost Tree of Easter Island: A Morphometric Comparison between the Remaining Ex-Situ Lines of the Endemic Extinct Species Sophora toromiro. *PLoS ONE* **2014**, *9*, e115548. [CrossRef] [PubMed]
25. Espejo, J.; Baeza, M.; Ruiz, E.; Mora, F.; Gomez, G.; Montenegro, G. Propagation of Sophora toromiro through interspecific grafting to support species conservation. *Cienc. Investig. Agrar.* **2013**, *40*, 213–221. [CrossRef]
26. Pedrotti, F. Il Parco Nazionale di Bialowieza. *Nat. Mont.* **1980**, *3*, 177–187.
27. van de Vlasakker, J. *Bison Rewilding Plan, 2014–2024*; Rewilding Europe: Nijmegen, The Netherlands, 2014.
28. Bösenberg, J.D. *Encephalartos woodii*. The IUCN Red List of Threatened Species 2022: e.T41881A51057496. 2022. Available online: https://dx.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T41881A51057496.en (accessed on 26 November 2022).
29. Jones, D.L. *Cycads of the World: Ancient Plants in Today's Landscape*; Smithsonian Books: Virtual, 1993; 456p.
30. Cayot, L.J.; Gibbs, J.P.; Tapia, W.; Caccone, A. *Chelonoidis abingdonii*. The IUCN Red List of Threatened Species 2016: e.T9017A65487433. 2016. Available online: https://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T9017A65487433.en (accessed on 26 November 2022).
31. Bachraz, V.; Strahm, W. *Hyophorbe amaricaulis*. The IUCN Red List of Threatened Species 2000: e.T38578A10125958. 2000. Available online: https://dx.doi.org/10.2305/IUCN.UK.2000.RLTS.T38578A10125958.en (accessed on 2 December 2022).
32. Irwin, A. The loneliest trees: Can science save these threatened species from extinction? *Nature* **2022**, *609*, 24–27. [CrossRef] [PubMed]
33. Dubois, P.J. *À nos Vaches: Inventaire des Races Bovines Disparues et Menacées de France*; Delachaux et Niestlé: Paris, France, 2011; 448p.
34. Cianfaglione, K. Le antiche varietà ortofrutticole nei campi abbandonati. Valori e potenzialità. Atti del convegno semi e frutti antichi, Rieti—11 aprile 2019. Aula magna del polo universitario Sabina Universitas, via A.M. Ricci 35/a, Rieti. European Consumers, Ufficio Stampa, Cittaducale: 1–5. 2019. Available online: https://www.europeanconsumers.it/wp-content/uploads/2019/07/Atti-convegno-11-aprile_Kevin-Cianfaglione_Le-antiche-varieta%CC%80-ortofrutticole-nei-campi-abbandonati.pdf (accessed on 2 December 2022).
35. Searchinger, T.D.; Beringer, T.; Holtsmark, B.; Kammen, D.M.; Lambin, E.F.; Lucht, W.; Raven, P.; Van Ypersele, J.-P. Europe's renewable energy directive poised to harm global forests. *Nat. Commun.* **2018**, *9*, 3741. [CrossRef] [PubMed]