Nature Restoration Without Dissimulation:
Learning from Japanese Gardens and Earthworks

On the face of it, the expression "nature restoration" may seem an oxymoron, for one may ask whether it makes any sense to suppose that human beings could restore that which is not human. Several writers recently have argued that, strictly speaking, this is nonsense and, furthermore, that the conceptual confusion involved may lead to ethically problematic consequences. In this essay I begin by discussing the problematic perceived in the notion of nature restoration. I proceed to consider Japanese gardens and earthworks, insofar as both types of art forms foreground the relationship of artefactuality to nature. I conclude that the counterintuitive way in which these arts engage us with nature may help us understand the manner in which nature restoration is plausible.

Nature restoration and its problems

One might suppose that nature restoration is a straightforward matter. Given the systematic incursion of human activities in nature, and given the ever increasing pace at which this incursion is happening, it would appear no more than common sense, or perhaps common decency, to return to a natural condition as much as possible of what we have appropriated (see Gunn, 1991). This simply is a matter of restitution. Recently a variety of questions have been raised with regard to both the feasibility and the reasonableness of restoration.

Without attempting to be comprehensive here we may note that restoration may mean a) mending or repair of an existing thing, b) full re-creation of a particular, formerly existing thing, c) full re-creation of a formerly existing sort of thing, or d) re-establishment of formerly existing natural processes. In every one of these cases, restoration is intended as a productive process initiated and designed by human beings. If we apply this general conception of restoration to cultural artefacts such as buildings, we can already gather some of the problems that may arise in restoration of nature. We may think, for example, of the Waldheim Chalet near Cradle Mountain in Tasmania or the Frauenkirche in Dresden, Saxonia, eastern Germany.

The Waldheim Chalet, originally constructed at the beginning of the 20th century, had long been considered “one of Tasmania’s cultural icons,” but fell into disrepair, and was demolished for safety reasons in 1976. As a result of “public disbelief and outcry,” the Chalet eventually was reconstructed, partially with materials salvaged from the original building (Saunders, 1993). Carpet-bombing raids that also demolished most of the city destroyed the Frauenkirche of Dresden, but now, under the impetus of the German reunification, the church is completely being rebuilt, also partially utilizing materials salvaged (see Zumpe and Krull, forthcoming 2001). Both of these are attempts at re-creation of a particular, formerly existing thing, and questions have been raised about the meaningfulness and value of these actions.
To begin with, one may wonder the degree to which reconstruction may accomplish replication, given that materials, techniques, and environmental conditions change over time. In the case of the Waldheim Chalet we may take into account that the replica is going to be different from the original, among other things, for safety and longevity reasons, in order to prevent having to replace it once again in short order. This type of problematic we may call the imperfect imitation objection.

Then there is the problem of strict irreplaceability (much emphasized by Robert Elliot 1982 and 1997), for no two things with distinct historical beginnings are identical with each other. In other words, even if, contrary to reasonable expectations, the Frauenkirche were replicated to the degree that experts could not detect that it is a copy, it would still differ from the original in its historical provenance. As Elliot has argued, historical provenance, however, has an impact on the way we value certain things such as cultural icons and, hence, the value of these replacements is not likely the same as the value of originals.

Furthermore, there is the problem of possible deception. Presently the Frauenkirche is surrounded by scaffolding and signs that loudly advertise its process of reconstruction, but in a few years visitors to Dresden may perhaps be deceived into believing that the building is much older than it is, which may contribute to the loss of awareness of the terribly destructive Second World War which Europe fought and endured in the 20th century.

With regard to nature restoration, problems similar to those that arise in the case of cultural artefacts arise. First, it has been questioned to what degree our techniques can replicate what nature has made. This obviously is a complex and rather puzzling problem when non-human nature rather than another human maker is to be imitated. To this must be added the replacement problem. As developed by Robert Elliot in his paper “Faking Nature,” the issue is that, insofar as nature restorations are made by human beings at some point after at least partial destruction of the original, they fail to have the “causal continuity with the past” which wild nature has (Elliot 1982). And, insofar as we value nature’s independent or autonomous development, given that restorations have an interpolated human activity as origin, they fail to have the value of original nature.

The idea is that, just as even a perfect reproduction of a Rembrandt painting is not, and should not be, valued in the same way as the original, even a perfect re-creation of nature is not comparable in value to the original that it is meant to replace. To pretend that restoration has not taken place at such places leads to the problem of possible deception. For this reason nature restoration has been compared to (ethically problematic) fakery, forgeries and big lies, whereby restoration amounts to a kind of fraud (Elliott, 1982; Elliot 1997; Katz 1992).

Nature restoration, however, is subject to a further complicating problematic, namely its artefactuality or artificiality (especially see Katz, 1997). While the fact that the restoration of the Waldheim Chalet is an artificial reconstruction poses no further problem, since the original itself was an artefact, in the case of the restoration of nature such artificial production seems to generate an insurmountable difficulty. The problem has its origin in the idea that the natural is thought of as something not authored or made by human beings. But, from this point of view, all (human) attempts at nature restoration must fail since it would be an inherently contradictory affair.

Obviously, these diverse problems will appear less serious the more restoration is accomplished with the
aid of natural processes, thereby functioning as a form of assisted re-generation. Nonetheless, insofar as restoration is initiated and designed by human beings, it may be argued that its product is always a kind of artefact, no matter how much natural processes are involved. Hence, we need to ask whether there is any point in proceeding with nature restorations.

I propose that, to obtain a clearer view of the kind of interaction with nature that is represented by nature restoration, we consider two site-specific art forms, Japanese gardens and earthworks. The reason for focusing on these art forms is that, in contrast to paintings and sculptures, which in the past have been drawn upon to help clarify the conceptual status of nature restoration, Japanese gardens and earthworks are exemplary as works that directly seek to represent a distinct relationship of human beings to nature.

**Japanese gardens and earthworks** Gardens constitute manipulations of nature *par excellence*. This is particularly obvious in European formal gardens. Those gardens freely make use of shrubs and flowering plants to exhibit patterns intended to represent various abstract ideas, such as order in the universe or the hegemonic power of a potentate. The situation is subtly different in the case of traditional Japanese gardens (see Purkayastha, 1993 and Yoon, 1994).

Certainly it is a mistake to suppose that all Japanese gardens are of one sort; quite to the contrary (see e.g. Eliovson, 1971; or Conder 1964). Without concerning ourselves here with fine distinctions it is notable that, in contrast with formal European gardens, Japanese gardens generally aim to portray nature in its essential characteristics (Carlson, 1997; also in Carlson, 2000). Some typical Japanese gardens, such as Kenroku-en in Kanazawa, attempt to capture the interplay of plant life, wind and salt water along the Japanese coast through the image of gnarled old pine trees planted on the shores of a pond with an irregular shoreline. Other Japanese gardens seek to remind onlookers of remote mountain valleys by displaying creeks flowing amid oddly shaped rocks on shaded mossy hillsides.

A focus on nature as found in one’s own region is emphasized by the preference for local vegetation and natural scenery lying outside the garden proper by the deliberate creation of openings between trees and shrubs. Stones, which constitute a fundamental part of Japanese gardens, are carefully selected for their weathering and are placed in such a way that they give viewers the sense that they 'naturally' belong where they are, and in the combinations in which the viewers find them. As such, these forms of gardening attempt to emblematically represent (or present) the processes and spaces found in wild nature, away from city and practical concerns of human life.

It is to be noted, however, that, although tended with great care, these gardens are said to represent the Japanese "appreciation for incompleteness" (encompassed in the terms *shibui* and *shibusa*). For example, the pine tree is not allowed to attain its full stature, as would be desired by foresters in healthy specimens, but constantly is pruned in order to gain and retain its gnarled appearance, while the rocks displayed may be so oddly shaped that a builder would probably reject them. These kinds of choices reflect the idea that "nothing should be too perfect or it will fall short of reality and become artificial." (Eliovson, 1971, p. 28) Another commentator notes that "absolute perfection ... would fail to embody beauty" since it is "through imperfection that perfection is recognized and beauty appreciated. A form that was perfect would be static and dead." (Holborn, 1978, p. 22)

The consequence is that symmetry, as is common in French formal gardens, typically is shunned. Instead, gardens are laid out in a manner that recalls complex natural areas, mimicking the sea with its
islands, riverine valleys and mountainous areas. In addition to these empirically relevant factors one may note that Japanese gardens ultimately hark back to traditional Japanese beliefs according to which one could perceive spiritual existences (*kami*) in prominent natural features, such as old trees, weathered stones or certain mountains. Throughout the course of Japanese history various further layers of nature-related significance were added, culminating in the adoption of gardening by Zen Buddhism as a way to illustrate the underlying unity of all things (see Davidson, 1982).

Finally, in the tea garden, the express intent is to induce reflection and thoughtfulness on the way to the teahouse and its ceremony. All in all, these various strands of ideas behind the history of Japanese gardens crystallize in the notion that nature is not to be subordinated by human beings. Rather, it is supposed that, insofar as we are part of nature, or perhaps in some sense even 'identical' to it (see Saito, 1985 and Holborn, 1978, pp. 57-58), we can gain insight into the proper place of human beings by reflection on autonomous nature as presented in the garden (also see Purkayastha, 1993, p. 421).

Many who have visited Japanese gardens will agree that these gardens tend to be very effective in inducing a high level of appreciation for nature as displayed there. Allen Carlson goes so far as to argue that the aesthetic appreciation elicited by Japanese gardens is such that the sort of critical attitude that he deems appropriate for the appreciation of artworks is out of place there (Carlson, 1997/2000). Rather, although qua gardens they are artefacts, he proposes that they are more fittingly appreciated as nature is. This sort of observation may lead one to conclude that Japanese gardens provide first-rate models for nature restoration because, while artefactual, they make us feel that we are surrounded by nature. As we will see below, however, this is a highly paradoxical judgement.

If Japanese gardens appear like examples of the closest that art may come to nature restoration, earthworks likely are considered the most removed from it. Earthworks are a kind of site-specific art that came into prominence in the late sixties and has more or less flourished since (see Sonfist, 1983; Ross, 1992/1995). As various authors remind us, these often aesthetically captivating objects have been made ever since prehistoric times, although they have not been recognized as art until recently (Bourdon, 1995).

The term 'earthwork' is not well defined and is often used interchangeably with 'land art' or 'earth art.' Typically earthworks consist of large-scale works, carried out with heavy machinery. Some of these sites function as a form of industrial reclamation (e.g., Robert Smithson's *Broken Circle/Spiral Hill* 1971). Land art tends to represent a gentler approach to the terrain than earthworks. Characteristically land art may consist of the arrangement of stones (in circles, long lines, or in piles, for example) preexistent on the surface of a site, as was done by Richard Long while on extended walks in remote locations in South America and Britain.

I propose to focus here exclusively on those site-specific works which, as is common for the works of Smithson and Michael Heizer, require a considerable amount of disturbance of earth and other natural materials, and which explicitly treat land at a particular site, with its rock and dirt, as mere *material*. The motivations for each instance of earth working vary, of course, but the underlying idea in such works is to make good use for art of spaces and earth as found in abundance in places such as deserts, mesas, and dry lakes.

Michael Heizer's *Double Negative* (1969-70), for example, is located in a bend of Mormon Mesa at Virgin River, near Overton, Nevada. It consists of an incision, 30 feet wide, 42 feet deep and 100 feet...
long, into the edge of one side of the mesa, and continued across a wide gap on the other side in an identical manner (Gruen, 1977). In the process, Heizer moved 240,000 tons of rhyolite and sandstone. He explained that he was interested in drawing attention to the 'negative space' encompassed in the total distance of 1500 feet; the piece, he claimed, is about absence (Bourdon, 1995, p. 218).

Notwithstanding the artistic merit of earthworks, they have been severely criticized by environmental aestheticians and environmental ethicists, such as Carlson and Peter Humphrey, respectively. Carlson thinks that such works constitute an "aesthetic affront to nature" because, in the process of their creation, they neglect to respect the aesthetic value of preexisting nature (Carlson, 1986/2000). Humphrey objects to such works because of their present and/or foreseeable negative ecological consequences (Humphrey, 1985). It may be questioned, however, whether singling out earthworks in this manner is fully justified. Certainly earthwork artists are not doing anything very different from what their non-artist contemporaries in industry are doing when mines are dug or urban developments and highways are blasted through hills and glades. If earthworks are “affronts to nature,” large-scale developments of these sorts must be considered much more intrusive. This circumstance makes one wonder whether the negative aesthetic assessment of the relatively minor incursions into the land represented by these earthworks does not stand for an excessively conservative preference for the merely utilitarian over the artistic avant-garde, the reasoning being perhaps that we see an obvious direct benefit in those mines, new roads and new suburbs, but not in this new kind of art.

Also, since earthworks are hard to make or to get funded, very few actually are realized. So, although making earthworks, as defined here, indeed causes a certain ecological disturbance in natural spaces, it remains unclear whether the countless painters, with their oil paints and turpentine, or the many artistic photographers, with their emulsions, are not doing more damage to the fabric of the earth in the long run. Nonetheless, it seems quite clear that earthworks are, if anything, counter-images to what nature restoration may be, but perhaps this judgement is too precipitated.

**Artifice and nature**

As noted, Japanese gardens may seem veritable models for nature restoration, both in execution and underlying ideology, while earthworks may seem to represent the very opposite. However, even if Japanese gardens may constitute highly engaging representations of the essence of nature, both their creation and their maintenance require thoroughgoing *artifice*. Just as the 'Arcadian', pastoral English gardens, initially designed by Lancelot Brown 'Capability' (1716-1783), Japanese gardens may require considerable earth moving, water basin creation, rock transport, planting, and continuous upkeep.

Walking in a Japanese moss garden, for example, means that one likely will see teams of gardeners removing even the smallest bit of grass, while, when admiring the gnarled pine tree that reminds us of its counterpart by the seascape, we may also be looking at crutches intended to hold up its precariously balanced branches which are a product of decades-long cosmetic pruning. In fact, Japanese gardens may be as thoroughly artefactual as their various European counterparts.

Ironically, earthworks, which when first executed resemble lands that cry out for restoration, eventually tend to turn into the opposite. That is, in as much as earthworks when first executed may resemble industrial interventions in the land, after some time they are redeemed back by nature. This is the case with many of the early pieces. I found this out through personal experience when I sought out Heizer's...
Double Negative in 1994. To my surprise, the site had changed considerably from its appearance in the photographs in circulation, which date back to 1970 when the work was first made.

Those photographs (which still are being reproduced in publications printed as late as 1995) show a neat cut in the rocky mesa intended to illustrate Heizer's desire for works that demonstrate "durability and precision" (Bourdon, 195). In 1994, though, I could see that on both sides of the piece the walls had begun to crumble, large rocks and mud washed out of the walls had accumulated in the supposedly empty spaces of each 'negative,' and various local plants had taken root here and there. These counterintuitive observations regarding Japanese gardens and earthworks lead me to a consideration of the larger context in which our appreciation of these artworks figures.

My personal experience is that neither Japanese gardens nor earthworks make me feel uncomfortable, despite the evident display of human control implied in their thoroughgoing artefactuality. In contrast, I find quite disturbing the fashionable, aestheticizing landscaping designs, featuring ponds and manicured lawns, built in order to raise the value of upscale real estate in Canadian cities. Similarly, I wonder about the sense of creating deep gashes in native rock, carried out simply to speed up automobile traffic, especially when the consequence is that previously remote natural areas will thereby open up to unbridled development.¹⁰

In fact, we can imagine instances in which the appearance of a Japanese garden or of a site-specific earthwork approximates that of corresponding commercial-industrial undertakings, and still be struck by a significant difference. My guess is that the difference in our reactions has something to do with the fact that, qua artworks, Japanese gardens and earthworks make a claim as expressions of a certain sensibility (see, e.g., Lyas, 1997; Ziff, 1984/1997; Geertz, 1974/1997), and, as such, they invite us to look beyond their immediate, practical impact on human interests.

That is, as artworks they represent calls to let our imagination wander and to conjecture about the insights that may have inspired their authors to make each particular work at the particular location chosen, with those materials, and with that appearance. Concretely, Japanese gardens usually incite us to remember those pristine natural spaces in hills and glades that may be hard to reach for urban-bound citizens, while earthworks, in comparison, call for our consideration of human disturbances of such wild nature. In these ways, Japanese gardens and earthworks enunciate very particular, contrasting sorts of human-nature relationships.

So, what can we learn from these contrasting sorts of interventions in nature? Japanese gardens are like fingers pointing to what nature has to offer to us. By making, for example, a space for asymmetries and for what seem to be imperfections from a practical point of view they also put human lives into the context of nature, suggesting ways in which the skewedness and imperfections in our lives may be acceptable. These gardens promote ‘the look from above’ sought by the ancient European schools of philosophy (e.g., the Stoics and Epicureans; see Hadot, 1995): even if from close-up our lives may seem twisted and accidental, they may make some sense when seen in relation to nature.

Moreover, by making us feel comfortable in what seem to be natural spaces, Japanese gardens help to make alien nature somewhat less alien, without failing to point out with their unexpected turns and vistas that nature will be surprising at times. Furthermore, by creating the illusion in the visitors of being in natural spaces while simultaneously displaying the illusory character of those spaces through diverse gardening props, they bridge the gap between the artefactual and nature without denying it.
Earthworks, in contrast, are like fingers pointing to what little we offer in exchange for nature. They show this by mimicking the rough handling of wild, natural spaces carried out by our entrepreneurs and whitewashed by our policy makers on a daily basis. The difference between earthworks and industrial interventions in nature is that earthworks, insofar as not otherwise useful, leave the onlooker no choice but to reflect on the place of human intervention in wild nature and, in this way, may lead to renewed attention to the supposedly justified interventions in nature of the everyday. Furthermore, at least in many cases, to look at earthworks is also to look at the wilderness that surrounds them.

From *Double Negative*’s cut into the subsurface of the land, for example, we come into the presence of the workings of the earth from a long time back, the distant mountain ranges with their impregnable walls, and the daunting desert floor that calls on the eye to travel to a far horizon. Together all these facets of the land, highlighted by the sitedness of the artwork, function as reminders of the otherness of nature, of its alien character. They also are warnings about the blindness that results from coming too close to nature in the process of treating it as mere material for our passing consumptive urges: if all we see is a future mine or road or housing development we may fail to see all those other faces that nature freely offers.

While earthworks are artefacts without any pretense of representing nature, they, like Japanese gardens, may also provide us with something like a bridge between the artefactual and the natural. Even if these works represent assaults on nature, calculated aesthetic affronts if you will, they are also essentially human gestures in nature. Despite our distaste for the sort of disturbance of the land that they represent we may, nevertheless, recognize ourselves in them. This is similar to what happens when in the theatre we recognize ourselves in the tragic heroes Oedipus or Medea of ancient Greek tragedy: we may not like the role, but, by adopting it for a time (at least in imagination), we may come to understand another facet of what it is to be human. Similarly, we may not feel inclined to identify with the sort of gesture earthworks represent, but, by taking ownership of those gestures, we may be more able to think about what it means to be human surrounded by nature.

Moreover, while in the case of Japanese gardens we can only fight their illusory appearance of naturalness by noting the markers of their utter artifice in the pruning and other constant manipulations to which they are subjected, in the case of earthworks we have the opposite task. We can only grasp that they have a relevance that goes beyond their nature-assaulting artefactuality by noting how they expose us to nature in the raw. These two sorts of art make both epistemological and moral points. They present alternative ways of cognizing nature and our relationships with it, and, consequently, raise the issue of how we may act with respect to that nature.

**Nature restoration without dissimulation**

As discussed, Japanese gardens and earthworks can bring us closer to nature by pointedly different strategies. Japanese gardens and earthworks seem to show that even very considerable interventions in nature can aid, rather than hinder our appreciation of nature—as long as those interventions are distinguishable from nature's doing. In this way, both types of art forcefully argue against dissimulation. Dissimulation, as Jean Baudrillard has reminded us (Baudrillard, 1983), is to feign *not* to have what one *does* have, while simulation is to feign to *have* what one does *not*.

Nature restoration is *not* the act of nature. This equally applies to the four modes of restoration sampled
above (repair, recreation of particular things, recreation of types of things, and re-establishment of natural processes): in every one of these cases, at least to some extent, restoration is the result of human aims and designs. While the problems of imperfect restoration may be gradually diminished though the development of technique, the replacement problem, and the associated problem of possible deception which arises if restorers hide their human interventions in nature, has no such solution. I propose that the only appropriate way to mitigate these problems is to avoid dissimulation in nature restoration.

By acknowledging that nature restoration creates artefacts there cannot be a question whether the product of restoration can replace the original, and by leaving sign of human agency at restored sites the problem of possible deception, and the consequent charge of fakery, forgery or big lies, can be avoided. Making human agency in nature restoration evident, moreover, may generate some of the benefits that we noted in the appreciation of Japanese gardens and earthworks.

Just as, through their attempt to emulate natural spaces, Japanese gardens direct our attention beyond their visible borders onto nature and its processes, leaving evidence that restorations are human attempts at imitating nature may similarly make us want to better understand the complexity of nature and its processes. And, just as through their rough handling of land earthworks invite reflection on the troublesome character of human agency in wild nature, leaving evidence on a site of human agency prior to, and through the process of, restorative work may help us to grieve for what nature is already lost through accident, carelessness and greed. In other words, human agency in restored areas should be openly displayed so that human visitors may benefit from the fact that restoration is a way of relating the artefactual and the natural. In this way, nature restoration may function as a bridge to non-human nature.

Practically, what does this mean? It suggests at least a judicious combination of a policy of letting be, insofar as natural processes can be allowed to come into their own again through it, and a policy of intervention, to remove human-created obstacles to those natural processes (Attfield, 1994), all the while leaving clear sign of what the human, artefactual contribution is. So, this might mean to regrade old roads in remote areas in such a way as to make their renewed use unlikely, but not in such a manner that all trace of human intervention is hidden. And it might mean to take logging and road building debris out of creeks to enable local fish species to reclaim them, but probably not to rebuild them in such a way that they appear untouched by human activity.

Certainly our limited ability to make peace with the land through restorative work can in no way justify further entrepreneurial incursions into what little wild nature is left (Light and Higgs, 1996). Treating the land as a mere resource available to unbridled exploitation by our own generation and banking on the expectation that nature restorers will be able to hide the damage later is like bombing our cities, with their cultural goods, in the expectation that the economic growth to follow destruction will pay for their reconstruction later. But, where the damage has already been done, it would seem justifiable and important to help the land recover some of its lost vitality. In those cases it is relevant that the less artificial the intervention, and the less dissimulated it is, the more plausible nature restoration will be.

Thomas Heyd
University of Victoria

References

**Philosophy and the Natural Environment.** Cambridge University Press. 45-58.


**Notes:**

1. For further discussion of the diverse ways in which restoration may be understood see Elliot, 1997, especially pp. 97-111. It is also to be noted that much of the relevant literature speaks of ‘ecological’ restoration (the restoration of ecological functioning), while I have chosen to discuss the more general case of nature restoration which, in any case, should include the concerns of ecological restoration as a particular variant.

2. Some, furthermore, speak of restoration when they mean re-clamation of a particular location, for its former uses or former ways of functioning. I do not discuss this connotation of the term since
reclamation might be considered a sort of second order activity: reclamation either is achieved through restoration as repair, as re-creation or as re-establishment of what there was previously, or through some other first order activity.

3. Elliot has argued that, in the case of nature, the value of replacements is less than the original. Perhaps one needs to be more global in the assignment of value, though. In the case of a cultural icon, for example, the loss of value in replacements in comparison with originals will be very heavy, but we can imagine circumstances in which such a loss may be at least partially compensated by possibly new facilities (such as enhanced safety, protection from environmental damage or from vandalism, and so on) only available in the replacement.

4. Dresden, we may recall, was the site of Allied bombing that killed more than 130,000 people, which is more than the dead of Hiroshima and Nagasaki combined. The event was vividly portrayed by Kurt Vonnegut in his *Slaughterhouse Five*.

5. As noted above, although Elliot takes it for granted that the value of the restoration will be less than the original, we should perhaps rather say that the value will be different and dependent on a rather global evaluation of the restored item.

6. It has been repeatedly suggested that, in some senses, human beings are part of nature too. We can grant this but still insist that the artefactual has to be defined in contradistinction to the natural.

7. On assisted regeneration as a kind of benevolent restoration see Andrew Light, 2000.

8. Of course, in Japan one can also find a diversity of garden styles that are modelled on gardens from other parts of the world, such as Korea or Europe. Here I use the expression ‘Japanese gardens’ to make reference to a certain set of *traditional* garden styles. Such garden styles were first systematically described in Tachibana no Toshitsuna’s 11th century *Sakuteiki*.

9. But see Carlson, 2000, 175-93, for a defense of large scale agriculture, which one might suppose is also a form of neglect for preexisting nature.

10. This is of concern, for example, in Extremadura, Spain, where, as a result of European Union roadbuilding grants, former wildlife refuges are in danger of disappearing.

---

Copyright © 2002, Humboldt State University