# The charcoal forest:

# Ecology, aesthetics, and the Anthropocene

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**Abstract** This article explores the significance of local forms of knowledge of the natural world, especially the role of this knowledge in cultural coherence and persistence through time, and its consequent significance to the intellectual challenges of the Anthropocene. The text examines the activity of a master charcoal-maker and forest-manager in Wakayama Prefecture, Japan, who works within a landscape recognized by the United Nations' Food and Agriculture Organization (FAO) as a Globally Important Agricultural Heritage System (GIAHS)—a place of special cultural and agroecological value. Drawing on theories of the evolution of knowledge and material culture studies, charcoal is seen as embodiment of particular understandings of the agencies of the natural world. Attention to the various stages in the production and use of charcoal sheds light on the structure of this knowledge, especially on the important areas in which qualities of one field of activity are transferred to or become essential to another. These "overlaps" link what otherwise appear to be disparate fields of activity into mutually constitutive elements of a whole. They shed light on the dynamics of cultural persistence and indicate the diversity of forms environmental knowledge; they can amplify understanding of the nature of the Anthropocene.

Keywords: Anthropocene; Knowledge; Coevolution; GIAHS; *binchotan*; charocal; aesthetics; Japan

*As above, so below.*

# Introduction

This article describes several scenes in the creation of high quality charcoal in Wakayama Prefecture, Japan. Since the full process of making charcoal, from initial growth of trees to firing of the kiln occurs on a roughly fifteen-year cycle and takes place at different sites and intervals across a landscape over the course of centuries, these scenes are only glimpses into the deeper rhythms also at play. This text therefore does not attempt to provide exhaustive description of charcoal as an artifact or, because charcoal is also involved in a second, complementary regime of land management, of the full agricultural cycle of which it is a part. Instead, it offers an exploration of the ways in which closer attention to such objects can expand perception of the different forms that knowledge of the natural world has taken, and the role of these forms in cultural coherence and persistence through time.

Charcoal is an interesting object for these purposes because it participates in several distinct sets of activity, each of which is to some degree expressed in the other. Charcoal is first of all born in mountain, forest and kiln through mutually constitutive sets of activities—the charcoal forest would not exist as such without the kiln, and the techniques of kiln management are related to the particular qualities of the forest trees. In addition, the techniques of forest and kiln management are also closely related to the way charcoal is finally used. Each scene or set of activities requires a distinct knowledge set, one that is at once aligned to and affirmed by the other.

Linking such different sites, activities, and knowledge allows perception of charcoal as a 'whole' cultural phenomenon—but not an autonomous one. As a whole, charcoal also extends into other realms of activity. In particular, it enables and is inseparable from an additional agricultural cycle that is essential to the wider community of the Minabe-Tanabe area of Wakayama. This pattern of co-constituent links between such different phenomena are described here as 'overlaps'. In some cases these overlaps may be largely 'ecological' in the sense that they can be traced through biophysical qualities or contexts. In other cases they are largely 'cultural' in the sense that they carry cultural preferences from one field of activity to another. In this latter dimension, aesthetic sensibilities appear to play a critical role, as they link different kinds of knowledge and experience. This chapter describes something of the structure and quality of these different overlapping forms as they can be perceived in a particular cultural landscape. In order to do so it draws on the expertise of a charcoal maker whose livelihood depends on his ability to perceive and convey the different material and immaterial forms taken by the agencies of the natural world.

# A forest underground

Japan has famously little oil, but it has in abundance something surely of even greater value: water. As a catchment for water vapor, the Japanese archipelago could hardly be better positioned. Surrounded by seas and ocean, stretched amidst great currents of tropical and arctic air and water, and topographically frenetic, Japan defines the northern and eastern limits of the great Asian Monsoon. Germany, about the same size and located along much of the same latitude, receives

about half the rainfall—so does the entire United States. The steep-sloped Kii Peninsula juts out from Japan's largest island into the Pacific Ocean, where it is a mixing ground for warm and cold currents of water and air. Wakayama Prefecture is located at the furthest extension of this peninsula; it has experienced some of the highest single-day rainfalls in the entire archipelago. There is little that can be cultivated on Wakayama's steep slopes in such conditions, but the products of the plants that can be conjured up out of the Earth arrive with special qualities.

The central mountains of the Peninsula are covered in deep forests of Japanese cedar which shelter in steep ravines, their upper reaches often enveloped in silent mist. An ancient pilgrimage route winds along the mountainsides to temples at which pilgrims have sought refuge and purification for several millennia. The scrabbly, hard-working coastal hills overlooking the Pacific Ocean, on the other hand, offer less grandiose vistas. Though largely covered in vegetation, even the idea of forest has to be stretched to fit the patchy jumble of plantation cedar, plum orchard, exposed mountainside and thick volunteer overgrowth running up and down the hillside faces (cf Tsing 2015: 193). I stood one fine June afternoon with a small party of researchers and local officials on a stubbly hillside. We were there to study the high-quality charcoal produced in the region, but at the moment there didn't seem to be much see. Spindly trees rose from protruding roots that provided the best footing available. The angle of the hillside was such that we were distributed along its vertical face, each of us fairly dedicated at any given moment to his or her own perch, talking up and down at each other as we tried to understand the landscape in which we stood. It was not as a forest is supposed to be. Aside from those spindly growths dispersed across its face and the bushes and shrubs peaking through the trimmings strewn below, the hillside had essentially been cut clear of its vegetation.

Nearby stood Masaaki Hara, who surveyed the land without comment. A master charcoal-maker, he was the responsible party. Two weeks earlier he had confronted this section of the forest, at that point containing busy upper, middle, and lower stories, and cut it to pieces. Nearly all standing vegetation had been removed. The early afternoon sun poured down, gathering on this exposed surface of the mountain as we stood with a view of the thick growth on adjacent slopes. It was obvious that clearing this land had been a very physical job.

When we did clamber from one perch to the next, the soil we stood on crumbled down slope. "Soil" isn't at all the proper term for earth such as that. We hadn't taken much notice of it on leaving our vehicles at the paved road above or as we walked down the foresters' track to this spot. Now we could understand why it was described in a local museum as "mud-stone": the mountains around were composed of a young layer of compressed coastal sediment that had been slowly crumpled as it shifted upwards over the last 60 million years. As it has risen, this compressed material has been riven into densely packed layers and sections finally exposed at the surface as crumbling irregular-sized trapezoidal pebbles that now shifted around our feet and invaded our shoes. I had noted several major landslides and roadside works to shore up the roads that wound upwards from the narrow valley bottoms, and I could see now that constructing roads in such territory was a Sisyphean task. It was inherently unstable stuff. It could hardly be called dirt, except under the full canopy where the weathered material at the surface mixed with leaves that had mulched or been metabolized on the forest floor. Even there it would not hold together, but it was the sole moist frosting available at the edges of a very dense rock cake. As *soil* it seemed a farmer's worst nightmare.

And yet, look at the robust roots winding underfoot, and from these thin trees, no matter how spindly they appear at the moment, to the growth visible all around. Even on such slopes there seemed to be no fundamental inhibition to growth, no lack of nutrition or fertility. After considering

the place for a while, it became apparent that the comparison of this scrabbly hillside to a clear-cut section of ground was completely wrong. Clear-cutting is a ruthless practice, as anyone can see afterwards: the cutters and machinery leave a forest floor overrun with machine tracks and a terrible chaos of splintered tree remains. They are territories that look more like battlefields than any recognizable form of nature. This forest had been treated entirely differently. It had been reduced to its essential elements—at least those of interest to Hara—with leafy trimmings and smaller cut branches bundled and tucked downhill of prominent root stumps or spread around as ground cover. Hara's soft shoe prints—for he had cleared this entire hillside with no assistance whatsoever—left impressions, little pathways showing how it was possible to move up- and down-slope. Far from requiring a careful period of convalescence, Hara's hillside was primed for growth; it was a forest in waiting. It slowly occurred to me that we stood in the midst of Hara's mental model of a forest, one in which oak trees, especially a variety of sawtooth oak known locally as *ubame gashi*[1], would feature prominently.

As a master charcoal-maker, Hara must also be a master forest manager. His vocation is to enable the growth of the oak trees that cling to the cracked, dense earth of the steep and stormy hillsides of western Japan's Pacific coast. Hara's concern for these oaks is due to their honed ability to extract sustenance from such unruly conditions. This ability is manifest as an exceedingly dense wood that in Hara's hands (and those of several dozen other colliers in the area) can be turned into nearly pure carbon charcoal. The locally produced *kishu binchotan* is a substance of many remarkable qualities considered the finest charcoal in existence.

In a landscape of such steep and pebbly texture, in which heavy rain and earthquakes are constant presences, mountainsides left without ground cover cannot be expected to stay in place for long. Any attempt to make sustained withdrawals of timber (or any other material) from the landscape had better be carefully planned. Clear too much vegetation and the slopes may not be there when you return. Clear too little of the surrounding vegetation and volunteer growth could easily shade out the slow-growing oak. The correct balance is achieved through coppicing, an ancient technique practiced by forest-dwellers around the world. Coppicing entails harvesting part of a tree without killing off the root system below, allowing wood to be obtained from a single tree nearly indefinitely. In Europe, trees have traditionally been coppiced at about human height. Repeated trimming produces a thick trunk capped with a large knotty burl from which several vertical stems sprout after each cutting. Such trees can be many hundreds of years old, imposing and slightly unbalanced structures giving the strange impression of both age and youth.

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[1] *Quercus phillyraeoides*, though there are six or so local varieties with names including *bame, babe, ubame, umami.* There is often difficulty in translating between linguistic, regional, local, and latin nomenclatures, as the names by which plants are known tend to be irregular. Mertz (2011) discusses this issue specifically in relation to trees in Japan.

[2] These claims may be premature, as Wohlleben's (2015) discussion of the hidden life of trees indicates that there

Photo 1: A newly cleared and coppiced hillside. Trimmed oak and other clippings are spread around as ground cover, bundled together and tucked downhill of protruding roots, or removed entirely. (Photo by the author)

The coppiced oaks of Wakayama, in contrast, are cut at just about surface level and so lack the burly trunks that punctuate European landscapes. Their great bulk is underground: there is so little of them above ground that it is almost difficult to call them trees at all. The reason Hara's forest looks so strange and the exposed earth does not slip downhill at the season's first storm is that charcoal makers maintain great root systems, which expand slowly, out of sight, for at least as long as they are managed. They hold the hillsides in place. In a sense such trees are timeless: seasonal cycles certainly affect their growth, but they hide their age, and don't appear to complexify or change in any fundamental way as they live.[2] Linear time doesn't seem fully relevant to them. A newly coppiced hillside is not much to look at, but in shifting perspective its forest can still be found. If the forester knows what to do, the forest lives underground.

[2] These claims may be premature, as Wohlleben's (2015) discussion of the hidden life of trees indicates that there is much more going on between trees in a forest's subsurface than has been widely perceived. How this underground life is perceived by Hara and others with longstanding cultural experience in forestry seems another open question.

Hara stood among us with a strangely detached demeanor, surveying his landscape without making a move to adjust anything, to remove a straggling branch or cut back another bush or two. We knew that in cutting away the unwanted vegetation he had done the major part of the job, but I wondered how much more work would be required to keep things on track. I asked him how often he would have to return to manage this hillside before harvest.

"Well", he replied, "sometimes you do have to return to a cleared slope, but this one is done well and I won't have to return to it at all."

"Not until harvest? But when is that?"

"In about fifteen years."

## The magic ingredient

This paper explores the forms of knowledge engaged in making charcoal. It also asks of the significance of such knowledge today. What can an examination of an artifact like charcoal contribute to understanding of the present period of human-environmental change increasingly described as the Anthropocene (*cf. this journal;* Brondizio and Syvitski 2016; Crutzen 2002; Lewis and Maslin 2015)? The Anthropocene presents a kind of rationalist's dilemma: it provokes a profound anxiety of Nature on the verge of "unpredictable" and "runaway" climate change. But this anxiety is tinged by an almost-triumphalist sense of inevitability, of humankind finally abandoned to itself (Breakthrough 2015; Nordhouse, Shellenberger and Mukuno 2015). Even if its prominence in environmental research communities reflects the rise of instrumental description of the "Earth System" (Bonneuil and Fressoz 2015), the Anthropocene's depiction of an active, excitable nature also presents a profound challenge to the classical scientific mode of explanation so dependent on reproducibility and predictability. The Anthropocene does not at all banish science as a mode of description, or undo humankind's overwhelming dependence on its technological accomplishments (cf. Haff 2014), but it may finally erode the ideal of a stable, domesticated nature so prevalent within the idea of the Holocene (cf. Ingold 2000: 77).

In this sense, the Anthropocene's dilemma can be a productive one: even as it emboldens those in search of 'the big fix', it also invites closer attention to and broader discussion of the many different ways in which humankind has lived in the midst of nature for long periods of time (e.g. Author 2015). In this sense, the Anthropocene can also draw attention to the "conceptual grammars"—the particular understandings of nature and its workings that correspond to certain patterns of social, ecological, and economic exchange—that have guided human interactions with nature in different historical circumstances (Bonneuill and Fressoz 2015), and which in more recent times have led (or not) to concern of environmental 'tipping points', 'boundaries' and so on (Rockstrom et al. 2011;).

My approach in this field is informed by several years' involvement in the Globally Important Agricultural Heritage Systems (GIAHS) Program established in 2015 by the United

Nations' Food and Agriculture Organization (FAO)[3]. GIAHS is of particular relevance to this text as the charcoal-producing region of Wakayama is part of a wider landscape complex recognized as a GIAHS site in early 2015.[4] The GIAHS Program recognizes agricultural systems based on long-standing patterns of human-environmental interaction in specific places. Individual GIAHS sites vary widely, ranging from upland tea orchards to elaborate paddy-rice complexes to age-old agro-pastoral practices, but all present examples of great cultural-ecological complexity, of deeply rooted patterns of social and ecological interaction that are as present within local social practices, knowledge, and institutions as they are in biogeographical contexts. With often more than one thousand years of history in their home locations (and based upon even older landscape practices), GIAHS provide proven-in-place examples of what can be considered as some of humankind's best agricultural and environmental knowledge. At the international level, GIAHS is one of the few instruments to explicitly recognize the value of such knowledge as it is linked into local livelihoods, food cultures, agro-biodiversity, landscapes, and wider ecologies of a place, and furthermore, as this knowledge is also embedded in and expressive of particular cultural and historical experience and worldviews. The great value of the GIAHS designation lies in its recognition at the intergovernmental level of the *inseparability* of the social, economic, and ecological domains of life in a particular place, and the consequent implication that the future of such high value places depends on their continuing social and ecological viability. The GIAHS framework does not provide any easy answers to the dilemmas facing rural places around the world, but the sites can provoke more expansive conceptualization of the patterns and relationships involved in long-term persistence of cultural-ecological complexes, and the important forms, whether cultural, ecological, material, or immaterial, they have involved and that by extension must play some significant role in their futures.

At the national level, governments increasingly recognize that the GIAHS program also addresses national environmental targets and important domestic public issues such as rural decline, rural development and heritage, nature conservation, agricultural policy, food quality and public health. Though administrative sectoralism is still an obstacle, national ministries around the world are studying how GIAHS designation can help to synergize their efforts, for example in relation to national Sustainable Development Goal targets.[5] GIAHS is also often intuitively attractive to local communities, but at this level it must be noted that it is still something of a mystery. It is often difficult for local communities and officials to define the practical significance of GIAHS designation. The GIAHS mandate to recognize and conserve "agricultural heritage" itself is something of a paradox, as conservation implies a kind of buffer from the forces of development, while GIAHS communities are usually rural and poor, and seeking ways to self-valorize (Niles, in press). They face the conventional dilemma of how to "develop" or "progress" without overwriting traditional knowledge and practices on which local value is ultimately based. The GIAHS literature suggests "dynamic conservation" and many communities attempt or consider eco-labeling and agri-tourism schemes, or perhaps even the potential of payment for ecosystem services, but for the most

[3] Due to institutional particularities of the FAO, GIAHS had existed for about a decade at the time it was formally established. For further information of GIAHS see http://www.fao.org/giahs/en/ as well as Altieri and Koohafkan (2007); Koohafkan and Altieri (2017); Min et al. (2016), Niles and Roth (2016).

[4] See information at: http://www.fao.org/giahs/giahsaroundtheworld/designated-sites/asia-and-the-pacific/minabe-tanabe-ume-system/en/ [31 March 2017]

[5] See: http://www.undp.org/content/undp/en/home/sustainable-development-goals.html

part more substantial policy options or opportunities are still lacking. While the symbolic value of the GIAHS program is unquestionable, its potential to link historical cultural-ecological values to present environmental and social challenges is still largely unrealized. The program has not yet been able to articulate or facilitate the emergence of a compelling image of the future of 'traditional' agriculture or communities. In large part, the rural still appears as a passive actor or perhaps only as scenery (cf. Fitzsimmons 1989), especially in relation to the challenges raised in relation to the Anthropocene.

Based on my experience in the GIAHS program[6], I believe the lack of 'actionability' of GIAHS designation has to do with a general under-appreciation of the cultural dynamics within GIAHS—especially the central role of human knowledge in the long-term persistence of GIAHS communities. Among human communities, cultural persistence is a reflection of (or just another way of speaking about) the continuing relevance of particular bodies of knowledge. Knowledge dynamics are therefore perhaps the most important cultural factor affecting patterns of change through time.

Taking the perspective of the community-member acting within complex social and ecological worlds, GIAHS are created through highly developed and continuously evolving bodies of knowledge. Knowledge is the magic ingredient, it is ultimately "encoded experience" (Renn and Laubichler 2015: 3). In the context of agricultural heritage zones, it is apparent that much knowledge has to do with local understandings of the agencies of nature, and of the various ways in which these agencies can be drawn together to make certain patterns of livelihood viable through time, ultimately composing a larger complex. Such knowledge itself is a critical social resource, and its conveyance an essential social practice, but it is rarely written down. Rather, it is present in other forms that must be learned. In such contexts, writes Ingold (2000:22) "[w]hat each generation contributes to the next is an education of attention", one that allows individuals to attend to the meanings that are "immanent within the environment". The "clues" to which attention is drawn are landmarks that condense

> otherwise disparate strands of experience into a unifying orientation which, in turn, opens up the world to perception of greater depth and clarity. In this sense, clues are keys that unlock the doors of perception, and the more keys you hold, the more doors you can unlock, and the more the world opens up to you (ibid).

At the same time, such knowledge is not "just a mental structure. It also involves material and societal dimensions that play a crucial role in determining what actions are possible and legitimate in a given historical situation" (Renn 2015: 41). In both societal and material forms, knowledge thus plays dual roles in cultural evolution: it acts as regulative structure (as, for example, it takes the form of various social institutions), and it is expressed and renewed in the everyday practices that continually create the local agro-ecological complex, or what can be described as a niche. The niche itself—the cultural-ecological landscape—is therefore dynamic: "niche construction not only depends on complex regulative structures, but also in turn shapes them… the material culture itself becomes a crucial factor in the evolution of institutions and knowledge" (ibid: 42). We can sense the essential, dynamical role of knowledge in the evolution of

[6] I was a member of the GIAHS Scientific Advisory Committee from 2012-2015.

the whole, as, in short, the "societal and material dimensions of knowledge are… critical for understanding its transmission from generation to generation" (ibid: 41).

GIAHS sites can be seen in this light as particularly dense knowledge networks with long evolutionary histories in which material elements no less than immaterial elements are fundamental to persistence through time (cf Niles 2016). If knowledge is embedded in, and conveyed and adapted through, material things such as landscapes, plants, seeds, food practices (and so on), their cultural relevance depends on their continual renewal within ecological no less than cultural cycles and contexts. In this sense, GIAHS sites contain sets of hidden clues … things that are reflective of concepts and observations regarding the patterns and meanings of nature.

Hara's knowledge of how to make charcoal, arising and taking form among a certain group of people whose preferences and abilities it reflects, is usually described as cultural knowledge. It should also be seen as profoundly environmental, as it links a multi-decadal scale of forest management to the technical specifications of the kiln and the expressly cultural uses of charcoal. With some important exceptions,[7] material culture studies has not delved too deeply into this environmental aspect, preferring instead to remain firstly concerned with relatively surface-bound "issues of meaning and form", as the latter is often distinguished from internal properties (Ingold 2000: 340).

Similarly, traditional agricultural knowledge is often described as if it consists of sets of *agricultural facts* rather than of bodies of environmental concepts and frameworks that are expressed in both social and ecological form. It is in this sense that so many endeavors to include 'local ecological knowledge' seem so thin: they take local empirical knowledge (of medicinal plants, for example) and slot it into abstract taxonomies, searching to isolate its active properties, stripping it in the process of the contextual and relational dimensions through which this knowledge initially came into existence, and has remained sensible and adaptable through time. People, in short, are absented from the knowledge they have developed and this absence is of no small consequence to how their 'things', whether plant, ceramic pot, tool, technique, story, or entire landscape, are later described and understood (cf. van der Leeuw 2002; 2008).

Some provocative studies do indeed examine the making and use of material artifacts as extensions of wider "systems of thought and action" (Lemonnier 2016) or "the current of activity to which they properly and originally belong" (Ingold 2000: 346). In this vein, material culture studies can provide some clues to the forms of knowledge involved in charcoal production. As Ingold and Lemmonier and others make clear, knowledge related to the creation of an object is always linked to different kinds of knowledge pertaining to its use. Similarly, each of the key domains of charcoal discussed here—forest, kiln, use— involves a set of knowledge practices that are distinct from and yet also defining presences within the others. Making charcoal is therefore both *contingent on and*

[7] The work of Tim Ingold is a clear exception, especially his 2012 essay and volume Perceptions of the Environment (2000). His more recent "Toward and ecology of materials" (2012) engages several of the ideas discussed here—his idea of "meshwork" is similar to the idea of "overlapping" presented here, and also alludes to a related but still distinct and rich tradition of study in France of material culture, techniques, and technical choices and behavior, including fascinating work by Leroi-Gourhan 1993 [1964]), Pierre Lemonnier (e.g. 2002; 2016), and the journal Techniques and Culture until recently edited by Frederic Joulian.

*constitutive of* other practices—some material, others immaterial, some directly related to charcoal itself, and others (examined just below) that extend into more distant realms of activity. In full view (that is, from the view of the persistence of the whole cultural-ecologial complex of which charcoal is a part), these *overlapping* forms of knowledge and sets of practices allow charcoal to be created and recreated as an object of the past, dependent on the knowledge of previous generations, and yet always current in the landscapes, ecologies, and human experiences it connects. The knowledge surrounding charcoal is thus involved in the creation of both niche and structure. Tracing its links across these different fields can express something of the form of the 'conceptual grammars' of such relevance to our understanding of the Anthropocene.

## The charcoal landscape

The 'overlapping' just mentioned seems also present in the wider Minabe-Tanabe landscape recognized as a GIAHS site. As shown in Figure 1, the landscape is composed through several distinct but related major fields of activity. At upper slopes and deeper mountains, the forest is managed for charcoal. Plum orchards are concentrated throughout mid-slope (though at smaller scale they are distributed throughout the mountains), and rice paddy and vegetable cultivation is found along lesser slopes, surrounding inland villages, and at valley bottoms and alluvial plains. The charcoal forest plays a hidden but critical role in the character of all of these downstream practices. Like sawtooth oak, *Prunus mume,* also known as Japanese apricot, is one of the few plants suited to the area's steep and rocky soils. As long as a sod groundcover is maintained to avoid landslides, the trees thrive in the dense, highly calcium carbonate soils. As a result, Wakayama produces half of all the plum, or *ume*—pickled and aged it is known as *umeboshi*—produced in Japan, and the Minabe-Tanabe area of the prefecture (local population about 80,000) accounts for nearly the entire half. With more than 1200 years of cultivation in the area, *umeboshi* is essential to the local economy. Aside from the orchards along all mountainsides, ume production is also evident throughout the urban landscape, as pickling and processing requires labor and dedicated space. *Ume* is present in other cultural forms as well. It can be used to produce a subtle, earthy pink-colored dye for textiles. It has demonstrated health benefits as documented by the local plum reseach center (e.g.). As a cash crop, the principal value of *umeboshi* is related to its intensely tart flavor, and also for its medicinal qualities—though perhaps there is less awareness of this latter aspect at present. *Umeboshi* are consumed in many different ways, commonly in beverages (usually plum soda and wine, as well as other spirits), but is most widely found as condiment remarkably able to complement and unify the different dishes and flavors typically found on the Japanese table.

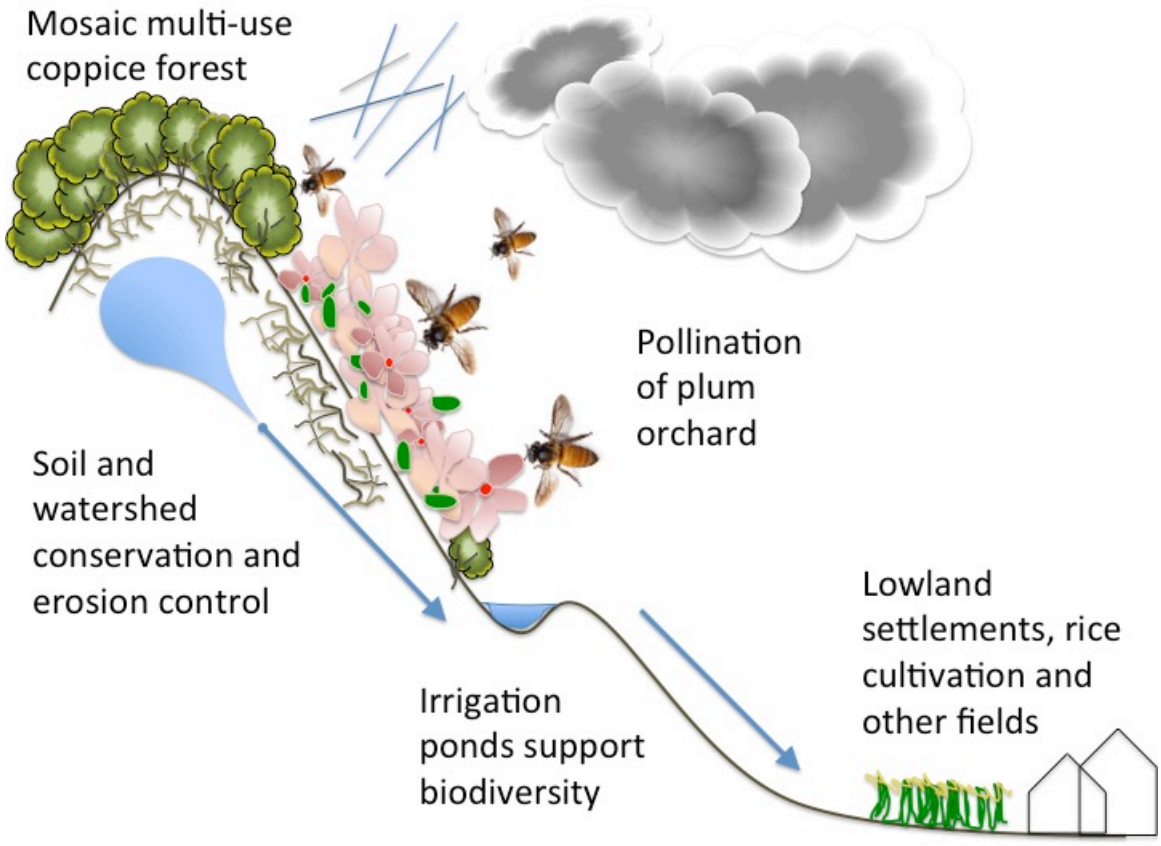


Figure 1: A model of the key ecological features within the Minabe-Tanabe GIAHS landscape (Redrawn by the author based on a figure available in: Minabe-Tanabe Regional Association for GIAHS Promotion (nd))

Strung with bright blue netting to facilitate harvest, the plum orchards are certainly the dominant element in the mid-slope landscape of the Minabe-Tanabe area. Less notable are the hollows dug out by local farmers along inner mountain valleys beneath the orchards. These small irrigation ponds act as catchments for the groundwater percolating through the mountains. They allow the water to warm slightly before it is channeled into rice paddies and other agricultural operations lining the narrow valley bottoms and short alluvial plains below. The two land-covers, coppiced forest and sod-covered orchards, therefore work together to moderate the flow of water downhill, helping to prevent landslides and floods downstream. At the same time, the mix of multi-stage perennial and fresh annual growth and series of rivers, creeks, catchments and paddies provide a landscape of many ecological niches. Biodiversity is remarkably high for such an intensively managed and productive landscape.[8]

[8] See Appendix 1 of Minabe-Tanabe Regional Association for GIAHS Promotion for a list of species found (nd).

Among oak (*Quercus phillyraeoides*) and plum (*Prunus mume*), the last essential species here is the Japanese honey bee (*Apis cerana japonica*). Tens or hundreds of thousands buzz innocently across the steep valleys, and they are the key to the sequence of forest, orchard, and food production found along the coastal range. Their hives—often looking curiously like Shinto shrines—are dispersed along the forested edges of the orchards. Managed for coppiced oak, Hara's forest never grows so thick as to shade out the wild flowering plants that sprout under its relatively open canopy. Even if cut back as severely as the hillside we had visited, there is plenty of fresh growth by the end of summer. These forest patches in various stages of regrowth are the bees' primary habitat. According to the local beekeepers, the bees spend eighty percent of their lives there. The grand exception is a period of several weeks in early spring when the plum orchards blossom in bursts of pink, white and deep red, providing a feast of color that must signal the highlight of a bee's life—especially as there are few wild flowering plants in the forest at that time of year. If the local economy is dependent on *umeboshi*, the pollination of the plum trees depends in turn on the bees and thus on the charcoal forests above (Figure 2).

Figure 2: A sequence of overlapping elements in the Charcoal-Plum landscape. The coppiced oak, honey-bee, umeboshi (pickled plum), and length of charcoal are produced or promoted by different human actors with separate but complementary bodies of knowledge and concerns. (Illustration by Juna Kurihara)

Figure 1 is extremely useful as a model of the general landscape sequence and structure. At the same time such models suffer from important limitations. They are descriptive, but not in any way explanatory. They highlight the functional ecological relationships of the landscape, but as mentioned above, human culture as a creative force is absent. The ideas, concepts, and concerns of the people whose perception and beliefs inform the daily, monthly, and annual decisions that create the individual elements of a whole landscape are instead represented as relatively autonomous ecological qualities. In real places with deep histories of cultural-ecological interaction, however, human practices transform ecological phenomena into cultural ones in ways that local people find particuarly useful and important, and that can be understood by successive generations. If the Anthropocene brings concern for the resilience of particular places, functional ecological description is of limited use. It does not describe how and why a particular 'system' actually acts or might change in the future: it even inhibits understandings of the "currents of activity" and "systems of thought" through which such landscapes are actually composed.

In this light, Figure 3 is intended to illustrate the contingent and constitutive—and overlapping—quality of the forms of knowledge that link different activities within a landscape. It indicates that the special quality of *binchotan*, though it is overseen by the collier who certainly must be considered the most knowledgeable of its qualities, is also assessed through the fields of activity surrounding its use. The highest quality charcoal is typically used in Tokyo and Kyoto at fine restaurants specializing in grilled eel, whose subtle flavor is a delicacy in Japan. With *binchotan,* food of the finest flavor and aroma is cooked in the most elemental way, over pure flame, often without any adornment but salt. The particular heat- conducting quality of *binchotan,* which once lit seems not actually to flame but rather to emanate a deep even heat, is considered the optimum way to reveal these prized qualities. In the end, then, the quality of the charcoal, and thus the action of the kiln and techniques of landscape management behind it, is judged by its ability to reveal a food's full fragrance and flavor.

Figure 3: The overlapping forms related to creation of charcoal. Clockwise from the top, the coppiced coastal mountains provide habitat for the bees, which are kept in small houses at the forest edges. The collier simultaneously manages forest cover and root systems, from which he is able to harvest lengths of oak. If properly dressed, in the kiln (at bottom) these lengths of wood can be transformed into high quality *binchotan*, a process that can be monitored by the color and smell of the *mokusaku* extracted from the kiln and the smoke issuing from bamboo chimneys. Finally, the quality of the charcoal is judged by the taste of food it is used to grill. As the collier acts in each of these different fields, he must think about the other, linking soil to wood, wood to smell and color of smoke, and so on so that the quality of the charcoal manifests the energies of the mountains. (Illustration by Juna Kurihara)

As he measures his activities, Hara must continually shift mentally between these different fields of experience: the mountain and forest (with all dynamics of weather, slope, soil), its relation to the quality of the wood that he harvests and the fire required for the charcoal it might produce. Lodged between the two fields of production and consumption—the expressly ecological forest and the largely cultural kitchen—is the kiln, inside which the qualities developed in one field become those of the other. In the course of twelve or fourteen days, the collier oversees a mysterious process by which cut lengths of scrappy coastal oak are transformed from their common state as green wood into a curiously compelling diamond-like material of dense blackness, one which retains, and somehow realizes, the dynamism of the mountainsides.

## The scent of the kiln

Approaching on the road above, the scent of the kiln is already notable. The hillsides converge on the creek just below; the forest is more open here, and the bluish smoke billowing under the canopy is cut through with lines of shadow and light. As we descend the pathway into the smoky enclosure, there is a feeling of entering a natural amphitheater.

Photo 2: Hara's kiln viewed from above. The main chamber is located under the roof at right. The extended chimneys appear on the far right of the photo; the mouth of the kiln faces downhill, and the area from which it is loaded, monitored and unloaded is located underneath the roof at center. Lengths of oak are lying ready for firing; some will have to be straightened before they can be loaded into the kiln. (photo by the author)

A backwoods charcoal kiln tends to be tucked out of view, looking like the past. They are workplaces, mountain encampments with few of the comforts of a home or homestead. Colliers have typically been a kind of itinerant worker. They tend not to own the territory they oversee,[9] but often live alongside their kilns. They were, and perhaps are still, regarded as a special kind of people, not the social folk of hamlets and villages, but mountain people living by the rhythms of the forest.

Hara's kiln seems no better or worse than any other. It is a set of structures notched into the mountainside, each made of little more than natural timber posts and corrugated metal roofs. Walls, when necessary, are made of rough-sawn boards. As a compound it has no pretense, yet it is carefully considered and strictly functional in its entirely homemade way.

The few tools necessary to the trade are lined up or hung from hooks or nails on the walls. Nearly every available level space is stacked with neatly trimmed lengths of oak. As these stacks are closer to the kiln they are stood on end, striking enticing horizontal and vertical patterns of light and shadow. The thinner lengths can be easily gripped in one hand and have an undulating straightness over their two-meter lengths, and an undeniable strength. The thicker limbs show greater age, tending to be more irregular, knobby and weathered. Like most living things, as dead weight they are deceptively heavy.

The kiln's chamber is the central feature of the operation. Tucked against the mountainside, underneath the two largest structures, it is far more prominent than the small space made for sleeping nearby. In conception and construction the kiln is like earthen ovens found all around the world, though here it takes the form of a fig-shaped dome built largely of ceramic tiles set in an earthen mortar. The same mortar covers portions of the exterior of the kiln so that it seems an organic extension of the earth itself. A single opening at the pinched end of the 'fig' can be enlarged to allow entry or sealed to control the flow of air drawn into the chamber, and so the quality of the fire within. Airflow within the chamber is also affected by a flue stone or stones set by the collier at the base of the chimney directly opposite the entrance and a third stone, or set of stones, at the chimney outlet protruding at the top rear of the kiln. Due to the incline of the hillside, this outlet just rises above ground level and long, thick stalks of bamboo fan out from it at angles, extending the chimney into the forest. The base ends of the bamboo are bound together and covered with a hood that links them to the outlet below.

We arrived in mid-January after an unusual and heavy snow. The kiln had been smoking away for the past ten days but its exterior surface was barely warm to the touch. Considering the fire we knew was glowing inside, it cast off surprisingly little heat, and we stood nearly shivering in the cold as we spoke. Still, there was something undeniably attractive and mysterious about the buried cauldron of fire, the smoke issuing into the dappled light of the open forest air.

Hara's skill as a collier is widely recognized; he was even described as a kind of "local hero". He appears in numerous educational and documentary materials related to charcoal, and was the chair of a committee formed to advise the local government on techniques of selective-cut forest management. He is able to make fine quality charcoal from the *ubambe-gashi* variety that is

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[9] This was an obvious matter, as when I asked if colliers might work their own lands one informant dismissed the question out of hand. He laughed: "You wouldn't have to work to make charcoal if you owned the mountain. You'd just sell the trees for money!"

favored by colliers of the region, as well as from several other varieties of oak, including one variety that no other collier is able to fire properly. These different varieties he mixes into a single firing, distributing them throughout the kiln according to some intuitive measure so that, as he said, "it all evens out". He receives visitors fairly often and is accustomed to explaining his operations and answering questions, and stood patiently as we asked him about the structure of the kiln, process of loading, how he deals with different species and densities and thicknesses of wood, and so on.

Depending on weather and season, the kiln is fired in a cycle of ten days to two weeks. For the first four days or so the kiln entrance is still open and the wood stacked just inside its mouth is burned down into coals. At the right moment the coals are raked into form and the kiln entrance is sealed with bricks and clay. Half a dozen holes are left open to draw air. If the kiln has been constructed carefully and the coals set well, air will flow in and along the kiln floor in a single arc, weaving amidst the vertically stacked lengths and up the chimney at the rear, maintaining a temperature of about 220 degrees Celsius within the chamber for the next seven days. Whether the lengths are thin or thick, whole or split, straight or straightened, carbonization begins in the hottest, oxygen-poor air at the top of the dome. The glowing heat descends from top to bottom.

Hara used a stick to draw a small graphic in the ash on the earthen floor. Yes, he said, it is important to get the correct spacing between the lengths, so that air will draw evenly and the heat descend uniformly. To maintain this spacing, the slow-growing knobby oak must often be straightened by a technique Hara demonstrated for us, quickly notching and wedging an arthritic-looking limb in three or four places. His chainsaw was at the ready and we now noted that little wooden wedges were spread around the ground a bit like confetti, though they had obviously been prepared deliberately. We watched as the length in hand suddenly stood straight before our eyes. His way of moving around the kiln was somehow difficult to grasp: he moved quickly, and useful things seemed to be everywhere at hand. Even when he would demonstrate some technique for our special benefit, there always seemed to be some breach between my understanding of his words, his gestures, and the goal of the task. While we were looking at the notches, he could see the straightened limb.

As our party discussed and clarified our understanding of his explanations, we also noticed that Hara, taking advantage of the spare minutes, began to enlarge the small intake holes in the kiln entrance. Every thirty minutes or so he would insert a metal rod into one or two holes and work it in a circular motion. Once he stood back and peered carefully through the largest opening into the red glow, studying the fire inside. At the first chance I followed his lead, but there was only a blur of red barely visible behind the heat. I didn't know what to *see*. It was a recurrent feeling. Kiln, wood, forest, charcoal: the pieces didn't seem to add up to any kind of whole. Though we discussed each element as best we could, it was becoming increasingly evident that we understood very little of the process as a whole, which is to say, of the charcoal itself.

Why, we asked finally, was his charcoal of such high quality?

Hara blanched slightly and then spoke slowly. "It's the soil and the trees," he said. "The soil here is so poor that the trees have got to struggle in order to grow. Their wood is denser and just stronger, better even than the same oak growing in other places." Perhaps out of humility, or the difficulty in putting into words and sentences something that stretched across landscapes and decades, he didn't seem willing to say more than that. And though he is one among only several dozen professional charcoal-makers of the area, and knows perhaps more than anyone else of the

entire ensemble of forces, agencies, and elements that finally do make the best charcoal, in a sense what he said is true and also not true, as the wood is not the whole story.

The local variety of sawtooth oak *is* an extremely dense and compelling wood. Cut into sections, its annual rings are nearly indistinguishable and its end-grain is so smooth it seems to have no pores. Such wood can indeed make a remarkable charcoal (Chia et al 2014), one burns slowly and evenly at medium-high temperatures. But even sawtooth oak is finally moist and pulpy green wood and Hara is after something quite different: he captures the oak trees' struggle to grow. As we stood in front of the kiln that day, the fire had already extruded the oxygen and hydrogen that comprise the bulk of the wood's structure. If he had opened the kiln and smothered the coals at that point, he would have made the charcoal that is typically found around the world, what is known locally as "black" charcoal.

Instead, with the smoke definitely blue around its billowing edges and growing more fragrant, in slowly enlarging the intake holes Hara began to lead the kiln to a special climax.[10] In this final twenty-four hours, he would allow the internal temperature of the kiln to climb to around 1200 degrees Celsius, entirely scorching away the bark of the wood and any organic compounds of its tissue and sap, and concentrating its carbon structure until almost nothing else remained. Then the kiln is opened. As an earthly material what emerges is something to behold: bone-like staffs of glowing light, about one-third their original diameter, three quarters the length, and one tenth its living weight. Whatever softness it had before has been extracted entirely, what remains is ninety to ninety-five percent carbon. Once it has cooled and can be handled, *Kishu binchotan* has the density of petrified wood, but a purity of something else entirely. Its annual growth rings are now visible in the end grain, which has been transformed into a glossy diamond blackness—so black and glossy that it is known locally as *white* charcoal. It is so hard it cannot be cut by any blade but only snapped off into sections with a quick crosswise blow. It is lifeless, and yet the stuff of life, dense with energy. It rings like a bell when struck, producing high, clear notes that sing of universal matter.

Hara would stay at the kiln all through the night, napping and adjusting the intake holes at thirty minute intervals, brightening the fire within, calibrating the final burn that would reveal the essential quality of the wood of the mountains all around. He began to seem less and less a land manager and more like a wizard collector of cosmic energies. If the secret resides in the wood, it is only half the secret for the management of the kiln is just as important, and just as obscure to the uninitiated.

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[10] Though there is some uncertainty in the story of this practice, it seems that the technique was initially brought to Japan from China around 1200 years ago and eventually associated with the Wakayama region and its particular quality of coastal oaks—the *Kishu binchotan* (Kishu is an historical name for this part of Wakayama) is therefore considered distinct even from the *binchotan* produced by the same method in other places.

Photo 3: The diamond-like end grain of binchotan (photo by the author)

I asked how he knew what was happening inside the kiln.

"It's the scent. The smell. And the color of the smoke. That changes. Now it's bluish. You can see it around the edges. Bluish, right? Earlier it was yellowish. And the scent is entirely different".

That day, Hara could sense that the kiln was not operating ideally. His kiln is in virtual constant use year round. It is only quiet during the New Year and Bon festival (a summer fire festival marking the return of the ancestors to household and family altars), when it is cleared and cleaned and repaired as necessary. Now, fully loaded for the first firing after the New Year, it was evident that further adjustments would have be made. The smell issuing from the chimney was still a bit more sour than he would prefer. In addition, slightly more smoke was issuing from the small intake holes on the right side than on the left. Hara judged that the kiln floor was rising slightly on the right and the wood therefore firing slightly more quickly in that area. The kiln was unbalanced and the smoke had a different smell, consistency and color than it should. Sense of smell is essential to managing the kiln and making good charcoal (just as it is in appreciating good *unagi)*, and this sense is one of the most difficult things to learn. Hara said his father (under whom he trained, and who he credited as a strict teacher) could tell if a neighbor's kiln was firing well, or if it was going too quickly or unevenly, just by the scent of the smoke as he was driving past.

Photo 4: The kiln is managed almost entirely based on clues gathered from the qualities of the smoke rising from the chimney. (photo by the author)

A collier must learn to perceive smoke in all its forms. About a hundred hours after the kiln has been sealed and the smoke issues from the chimney with a whitish color, a good collier will catch the smoke directly. A can is set loosely over the chimney just above the roof-line of the kiln, and the smoke, heavy with sap of the moist green timber, cools just enough within the can that its moisture will drip into a container below. This extracted liquid is known as *mokusaku* ("wood vinegar"). It is a common by-product of traditional charcoal making, and has been widely regarded as a flavoring for food, for its various uses in the garden, and especially for its antiseptic and other medicinal qualities. It also provides the experienced collier with an important measure of the carbonization process several days into the firing. A well-firing kiln loaded with quality wood will produce *mokusaku* of pure rich amber color and clarity with a fresh, almost sweet taste. If the kiln remains steady, *mokusaku* can be produced over the next five or six days. A poorly- or unevenly-firing kiln or one containing unfavorable material will produce a hazy *mokusaku* that is bitter and

dull and even toxic. Good *mokusaku* is useful around the home—local people swear by it—and it brings a bit of extra income, but most importantly its color and taste indicate that all is well within the kiln.

## Knowledge for the Anthropocene

Hara's charcoal demonstrates the elusive yet very real forms through which empirical knowledge has been recognized, organized, activated, and transmitted through time. It is a tangible object that can be held in the hand even as it extends across, participates in, and augments activities conducted across multiple ecological, cultural, technical, aesthetic domains. In this light, such artifacts have much more than symbolic value; they are evidence of what Descola (2015) describes as a people's "ontological sifting of the qualities of the world". They represent knowledge systems based on humankind's long experience of the agencies of nature.

Curiously, the links between different fields of activity in which such objects participate are often traced through ephemeral sensory phenomena, especially smell and taste, which might otherwise appear to reflect merely 'aesthetic' or perhaps 'stylistic' preferences. The elements so easily disregarded as decorative or otherwise extraneous appear instead to play a fundamental part in signaling qualities of special concern. It is notable that such qualities are also often definitive of the local, 'natural' sense of beauty—smells and tastes, richness of hue, significance of gesture, and so on, sensibilities that are the most difficult to develop and the least easily put into words.

These sensibilities also appear to play a special role in the persistence of a whole cultural complex, as the aesthetic 'power' of objects (or rituals, and so on) is related to their ability to leap between different material and immaterial realms (for example forest and kitchen), making immediately sensible the relations between otherwise distinct fields of activity, kinds of knowledge, and ways of knowing. The presence of one element subtly invokes the existence of the others in a series of self-affirming signs known to those who inhabit them.

If such patterns also enable the transfer of knowledge through time, the complicity of such different elements begs difficult questions of collective definitions of beauty, and of the relation of beauty to utility. I had begun on the mountainside to ask Hara to explain how he could indeed work in fifteen-year cycles in such a dynamic environment. "So this slope is facing…south?" Yes, it was a south-facing slope, but Hara was mostly bemused at the question. He wouldn't think of trying to describe the action of weather and season on the soils and roots of a mountain slope over a dozen years. Months later at the kiln, as we watched him gradually enlarge the holes in the door of the kiln, eyeing the smoke and peering into the glowing chamber, thinking of the fire within, we reached another limit to normal description, to the syntax of cause-and-effect.

Hara is used to explaining his craft and has taken many apprentices over the years. He shrugged. "Yes, charcoal-making is deep" he said, laughing softly. "It takes some special kind of sense. Knowing what to do based on the smells and the colors. Some people never get it no matter how hard we try to teach them".

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