Small, green, and prickly
Local botanical knowledge in Modern South Arabian languages

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Abstract

This paper examines factors leading to loss of diversity in Southern Arabia. Conservation strategies have failed to mitigate this loss (Titon 2016; Shahina Ghazanfar p.c. 2021) so new approaches to sustainability are needed. I propose building resilience into the biocultural system by managing adaptations to changes. Current and proposed strategies for adaptation include raising the prestige of local languages and ecological knowledge, supporting clear communication of that knowledge, and applying the knowledge to current sustainability issues. Similar situations of rapid cultural shift and language loss are used to demonstrate how some of these strategies have been applied in North America and West Africa.

Keywords: Modern South Arabian languages, traditional knowledge, biocultural diversity

1. Introduction

In Dhofar (southern Oman) and al Mahrah (eastern Yemen) there is an area of high biological diversity due to annual monsoon winds that bring moisture to the Dhofar Mountains. In this region there are also five indigenous languages: Mehri, Shehret, Hobyot, Harsusi, and Bathari collectively known as the Modern South Arabian languages (MSAL).

A global pattern of overlapping regions of linguistic and biological diversity has been demonstrated in recent studies with significant statistical likelihood of a connection between these diversities (Connolly, Beger, and Watson 2023; Gorenflo et al. 2012; Loh and Harmon 2005). This research has been repeated, finding similar results in regions such as North America (see Mace and Pagel 1995), India (see Upadhyay and Hasnain 2017), and Africa (see Moore et al. 2002). Maffi (2018) explains this pattern as the result of the coevolution of human beings and the ecosystem. She goes on to explain that

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this coevolution manifests itself in human culture through local knowledge which is expressed through local language. These linked diversities have been labelled 'biocultural diversity' encompassing linguistic, cultural, and biological diversity (Maffi 2005; Loh and Harmon 2005).

Further evidence for the link between linguistic and biological diversity is found in the observation both of these diversities are declining at a similar rate on a global scale (Loh and Harmon 2014). This is due to shared actors on the health of diversity (Pretty et al. 2009). For example, urbanisation affects biological diversity by destroying habitats and linguistic diversity by creating a space where a common language is needed. Therefore, sustainability of biocultural diversity requires consideration of how adaptations to these influences can be built into the systems of diversity.

The cultures that evolved in Southern Arabia were, until very recently, fully dependent on the local ecosystem and so speakers of the indigenous languages hold an intimate knowledge of that ecosystem. However, the traditional knowledge is disappearing in this region. This is a symptom of wider cultural and ecological changes largely due to rapid socio-economic development. Sustainability programs often work on the premise that change leads to demise and so resist change even at the cost of stagnation. This is not a feasible strategy in Dhofar because the changes that have led to the knowledge disappearing cannot be reversed. Sustainability must be achieved without reverting to times past.

According to Titon (2016) resilience is the ability of a system to adapt and regain equilibrium following disturbances. He goes on to argue that systems are constantly moving from one state of equilibrium to another. Sustainability is only found in adapting to the constant disruptions to equilibrium. Systems can be made more resilient by shaping adaptation in such a way that the system can be sustained.

Pretty et al. (2009) present an integrated approach to cultural and biological diversity conservation arguing that pre- and non-industrialised cultures have centuries of experience of co-dependency, or coevolution, within their local ecosystems. Building on this pattern Pretty et al. explore 'threats' to diversity. These threats are discussed in this paper, however, as disturbances to equilibrium. The 'threats' in Pretty et al. have dramatically improved the quality of human life in Dhofar within living memory. They cannot be treated as threats to be removed.

The list in Pretty et al. (2009) indicates the type of disturbances to biocultural diversity that might require adaptation. Section 2 works through some of these disturbances, discussing how they are manifested in Dhofar and how the system's adaptations have progressed with little to no intentional directing toward sustainability. Not all the disturbances in Pretty et al. are present in Dhofar, so the list is not completely reproduced here. A few of the disturbances highlight some assumptions Pretty et al. have made in compiling their list of disturbances. These are also discussed in Section 2.

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Section 3 describes the necessary foundational attitudes needed for resilience to be possible and Section 4 discusses potential and current methods for building resilience into the complex system of biocultural diversity in Dhofar.

2. Disturbances to biocultural diversity

Globalisation of food systems

The first disturbance we will consider is a shift from local to globalised food systems. Globalisation of food systems disturbs biocultural diversity through a change to monoculture commercial farming (Pretty et al. 2009). In Dhofar today, farming is not a major industry. The people living in the mountains sometimes had small plots for growing grains or legumes in the past (Miller and Morris 1988) and these can occasionally still be found today. However, wide-scale commercial agriculture does not exist. Therefore, the biological diversity in Dhofar is not threatened by globalised food systems in the way Pretty et al. expected.

Culturally, globalised food systems often disrupt traditional diets which leads to loss of traditional knowledge about local food sources (Pretty et al. 2009). The local flora in Dhofar traditionally provided a diet for the people, but it was dependent on unreliable rain patterns and often barely sufficient (Miller and Morris 1988). When asked about traditional foods in Dhofar, people talk about milk because it was the only reliable food source (Janet Watson p.c. 2021). Historically there were trade routes with India and East Africa that provided some food stability, but these were dependent on world events and easily disrupted by changing global political realities. Between World War I and the 1980s, food insecurity and hunger were major issues for the Dhofari population (Yahya al Mahri p.c. 2021).

Due to imported goods, local food plants are no longer urgently needed, and the knowledge of which plants are edible is disappearing. The information continues to be available – Miller and Morris (1988) contains a wealth of information about the local botany and has been fully translated into Arabic. It is passed around on WhatsApp as a pdf regularly. Additionally, there are still people who use the local botany for food and others are interested in learning more about local edible plants. There is interest in the knowledge, but communication has not been effective.

Urbanisation

Urbanisation is a disturbance that has wide-reaching ramifications for biocultural diversity in Dhofar. Pretty et al. (2009) predict that urbanisation will lead to habitat destruction which is already evident in Dhofar. Growing cities have led to a loss in forest cover, for example (Galletti, Turner, and Myint 2016). As Pretty et al. (2009) also predict, urbanisation is responsible for a disconnect from the local ecosystem. As families transition from nomadic

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or semi-nomadic lifestyles into towns and cities, children have become increasingly detached from the local ecosystem.

In terms of adapting to this disturbance, the culture retains a lot of nomadic ideology around dwelling (Boom, Ghazanfar, and Baquir 2022; Risse 2019). The nomadic mindset carries the assumption that there will be men traveling through at any given time, that there is a need for appropriate space to host them, and that this will happen frequently enough that building houses to accommodate them is necessary. Therefore, Dhofari houses often have two majlises, or sitting rooms: one for the family and one for only men. The men's majlis is usually self-contained and used for anyone who happens to be traveling through the area and needing a place to sleep.

Another way this nomadic mindset is still prevalent is that where one sleeps at night is not nearly as specific as in Western households. The idea of having one's own private space for sleeping is simply not part of the culture (Risse 2019). Rooms are regularly rearranged to meet the shifting needs of the people in the house; a guest room might be repurposed for family members who have fallen ill; an adult child's room might be reassigned if visitors arrive; or other family members return, such as a pregnant woman returning to her parents' home for the duration of her pregnancy and post-partum period. Each of these examples are taken from my own field observations.

Modernisation of healthcare

The modernisation of healthcare impacts biocultural diversity because it replaces traditional knowledge that is intimately connected to the local ecosystem with an entirely imported way of treating disease (Pretty et al. 2009; Shahina Ghazanfar p.c. 2022). According to Pretty et al. (2009), modernisation of healthcare leads to the devaluation of local medicinal plants and to their disappearance. This is a significant issue in Dhofar today. The medicinal plants are still present for the most part, but less and less people know about them. The smaller plants are decreasing in value and the monitoring of their health is nearly non-existent, so the extent of the biological decline is unknown. The plants' habitats are being disrupted by human encroachment (Galletti, Turner, and Myint 2016), overgrazing (Ball et al. 2020), and invasive species (Said Baquir p.c. 2021). At the same time, the knowledge about these plants is not being used or passed on to new generations and hence is disappearing.

There is interest in using the local botany for medicines. As mentioned above, Miller and Morris (1988) is passed around quite readily and includes a wealth of medicinal information. Additionally, in a recent survey I ran on the use of local botany, over half of respondents indicated they were interested in increasing their use of local botany for medicinal purposes. There is interest and the information is still available through both the elder

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generation and written literature, but the communication of that information is a limiting factor.

Modern medicine is not a threat to be removed. It is an integral part of the increased health in the population as a whole (Alshishtawy 2010; Miller and Morris 1988; Oman 2021). It is, however, a disturbance to the equilibrium of traditional healthcare and does pose a risk to biocultural diversity. The traditional knowledge still holds value - the local plants are used to treat symptoms of various ailments such as:

allergies treated using *səġōt* (Sheret), *Anogeisus dhofarica*;

wounds treated using *zibrōt* (Shehret), *Jatropha dhofarica* and *ʕoḳor* (Shehret), *Commiphora habessinica* to clean the wound, protect from infection, and help stop bleeding;

poison treated using *aṭəfīr* (Mehri), *Rhazya stricta* to induce vomiting;

headlice treated using *ḳəmerōt* (Shehret), *Ipomoea nil*;

fevers and coughs treated using *ṭayf* (Mehri), *ṭof* (Shehret), *Aloe dhufarensis*.

These remedies are not infrequently more accessible than modern health treatments. For this knowledge to be sustained, communication of the information needs to be strengthened.

Language erosion and loss

Language erosion and loss are a reality in Dhofar today as all of the indigenous languages are described as endangered to varying degrees (Watson and Al-Mahri 2023). Pretty et al. (2009) discuss the loss of intergenerational communication as language use shifts, which in turn leads to loss of local ecological knowledge because it is not being passed on to younger generations. Today this is a serious concern in Dhofar.

In school children are taught in Arabic, and their linguistic competence in their home language(s) is severely impacted. Their grandparents, however, either did not attend school or only completed a few years and so, often speak very little Arabic. In addition, children today are growing up removed from the local ecosystem. In contrast, their grandparents, and in some cases their parents, grew up relying entirely on that ecosystem; thus, their lived experiences are dramatically different. These taken together have led to appreciable loss of ecological knowledge over only one or two generations.

Recent documentation projects such as the Documentation and ethnolinguistic analysis of Modern South Arabian (DEAMSA)[2] have helped archive the languages and cultural information. Through this project, there

2 Mehri: https://www.elararchive.org/dk0307
Shehret: https://www.elararchive.org/dk0308
Hobyot: https://www.elararchive.org/dk0309
Harsusi: https://www.elararchive.org/dk0314
Bathari: https://www.elararchive.org/dk0364

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has been an increase in interest from the younger generations in the languages and traditions with some young researchers from the communities now writing about their own interests after being awarded funding through WikiTongues.

One example of where language loss is evident is that while there are words for numbers in Mehri, traditionally many things were not counted and labels for group sizes were used instead. The following words describe different types of livestock herd sizes:

- *ndərēt* 'very few goats, cows or camels'
- *ḥśār* 'very small herd of goats, cows or camels'
- *gɛzḥānōt* 'flock smaller than 30 goats/cows'
- *əlgəzḥāt* 'flock of about 30 goats/cows'
- *farḳ/ḥə-fərōḳ* 'herd of goats between 40 and 80'
- *maġzēl* 'even larger group of goats'
- *ġanṭəlōt* 'large herd of cows'
- *ṭəḥōb* 'large herd of camels'
- *ṭaḥībūn* 'very large herd of camels'
- (taken from Boom and Watson 2019)

Today, with numbers being a much bigger part of everyday life, these words are falling out of use and only the older generation knows them.

Another place this is happening is with time-of-day words in Mehri. There are at least ten words to describe time by the height of the sun before noon, another ten for after noon and before sunset and a further eight for nighttime (Boom and Watson 2019). Again, these words are falling out of use in favour of numeric time. When numbers are used, people tend to use Arabic numbers instead of Mehri ones.

In terms of the local ecosystem, names of smaller plants are being lost as younger generations grow up increasingly indoors. The plants themselves are also disappearing due to invasive species such as *Parthenium* and over grazing (Said Baquir p.c. 2021). This represents a language loss as the names are not passed on to younger generations, knowledge loss as these plants are not recognised by younger generations, and ecological loss as these plants are overgrazed and lose habitat and resources to invasive species.

Language erosion and loss are having significant impact on biocultural diversity in Dhofar today. Adaptation that builds linguistic resilience would include the languages being used in all linguistic environments with borrowed or new vocabulary for new technologies and situations (Stone and Anonby 2019). This adaptation is not evident in Dhofar; most people choose to switch to Arabic for topics that the local languages do not encompass. Most of the current adaptations are not leading to sustainability, therefore, intentional direction is needed.

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Formalised and privatised land rights

Pretty et al. (2009) discuss the formalisation of land rights as a factor in biocultural diversity loss as residents tend to lose access and rights through formalisation and privatisation. Land rights were formalised in Dhofar in 1974 when the Sultan nationalised all tribal lands (Janzen 2000). This led to some conflict ending as violent land disputes were strictly prohibited and severely punished. However, it also led to new problems. The camel herding groups were essentially given access to lands that they had previously been excluded from because the people living there were able to defend their land. Once the land was nationalised that defence became illegal. Some conflict was suppressed but at the same time some people lost access to their land, as predicted by Pretty et al. (2009).

Pretty et al. (2009) also mention that formalised and privatised land rights lead to reduced communal ownership. This assumes that in the past land was communally owned. In Dhofar, there was an element of communal ownership in that land was controlled by tribe rather than individuals, but land commons is not how traditional ownership was practised. Each man represents his tribe as an individual and each man could then make choices about allowing or disallowing access to water resources. However, tribes would have mutual agreements, and each tribe member was honour-bound to adhere to those agreements (Tabook 1997; Yahya al Mahri p.c. 2020). Therefore, the land was not held as a commons in general; it was already somewhat private prior to the nationalisation of the land. This disturbance has had a different effect than the one Pretty et al. (2009) predicted.

State territorialisation and nation building

In general, nation building disrupts traditional management programs and dislocates people from culturally significant lands (Pretty et al. 2009). In the past, both human and livestock population size was limited due to scarcity of resources and lack of veterinary care. Nation building disrupted this by improving both: importing fodder and building a veterinary network leading to a need for conservation planning and new constraints based on the health of the local ecosystem.

The dislocation of people from culturally significant lands assumes that the state either takes over/destroys those culturally significant places or restricts access. The culturally significant places in Dhofar are still present and still accessible. These places include shrines for ancient saints which are maintained by families or religious adherents, not the state (Tabook 1997). Another culturally significant area is the traditional grazing lands north of the mountains. These have degraded due to rain pattern shift and ground water exploitation, so their cultural value is diminished. In addition, water sources which were traditionally highly valued are less important today due to wells dug by the Sultan in the 1970s and water infrastructure development

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(Janzen 2000). The disruption to people's access to culturally significant land is not as significant as other disruptions in Dhofar today.

Transport network expansion

As transport networks expand, they encroach on habitats and increase pollution which erodes ecological health (Pretty et al. 2009). Air quality is a growing concern in the Arabian Gulf, but as of 2019, increased automotive traffic has not been a major cause of air pollution in Oman (Albusaidi 2019). This could change soon and considering the impact of increased automotive traffic should be included in any conservation or sustainability planning.

Habitat encroachment can be measured through forest cover decrease. While forest cover has decreased due to roads being built, this decrease affects a very small proportion of the forest and is a small portion the forest loss overall (Galletti, Turner, and Myint 2016). I am not aware of studies on the ecological impact of the expanding transport network in the regions outside of the forested areas of Dhofar.

Transport networks also grant easier access to previously remote areas which results in cultural assimilation (Pretty et al. 2009). The new roads built in Dhofar have led to easier access to more remote areas and this access has been used for grazing livestock in new areas (Galletti, Turner, and Myint 2016). Cultural assimilation can be measured in linguistic shift (Harmon and Loh 2010). In the remote areas where the less-prestigious MSALs are spoken, such as Bathari and Harsusi, cultural assimilation is evidenced in that both these languages have very few speakers. The larger MSALs are also losing ground to Arabic in a part-religious, part-nation-building disruption to traditional languages.

Of the disturbances discussed here, urbanisation, modernisation of healthcare and language erosion and loss are causing significant disruption to the biocultural diversity in Dhofar today. The following two sections outline what is needed (Section 3) and what is being done (Section 4) to shape the adaptations to these disruptions to support resilience in Dhofari biocultural diversity.

3. Resilience

Resilience is the ability of a system to regain equilibrium after disturbances (Titon 2016). Resilience can be intentionally built into a system but a holistic approach is needed (Titon 2016). The methods of building resilience described below depend on two theories. The first is biocultural diversity which begins with the interconnectedness of humans and local ecosystems and arrives at a place of conservation through that interconnectedness (Maffi 2007, 2018, 1998; Pretty et al. 2009). The second theory is that of adaptive management as presented in Titon (2016). This theory begins from a critique

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of conservation and sustainable development growth and from there develops concepts of adaptation to change and regaining equilibrium in the face of disturbances (Titon 2016). There are three important human aspects necessary to build resilience.

First, the people who will be responsible for sustainability must want to see the disrupted system sustained. In Dhofar, this desire is present and appears to be growing. In a recent survey I conducted on local botany, all participants indicated they were interested in increasing their efforts at conservation and over half indicated they would like more information about how the local botany can be used for food and medicines. In addition, some participants in the DEAMSA project have continued in various capacities to research and document the languages and traditions of the region. This indicates an awareness of the value of local languages and traditions and a desire to see them sustained even among younger generations who have not been dependant on that knowledge for survival.

Second, partnership is essential. A team of invested individuals with different expertise and passions will help ensure that many aspects of the system are included in sustainability goals. Sometimes the partnership requires an outsider's perspective to recognise the value in the systems present (Joranson 2008). DEAMSA helped light this spark in Dhofar and ongoing field research helps keep it going. In the survey mentioned above, respondents were given the option to participate in future projects dealing with local botanical knowledge and a group of interested individuals is starting to form, some of whom have been involved in the past, and some who have not. This partnership is growing and deepening in Dhofar today.

Third, a balance between innovation and orthodoxy is needed (Titon 2016): innovation to allow adaptation to the disturbances that inevitably come, and orthodoxy to maintain identity and cohesion even in the face of change. This balance can be intentionally shaped. Adaptations will arise in the face of disruption, but they may not lead to sustainability. In Dhofar, an adaptation that has taken place without intentionality is in response to the disruption that formalising the land rights caused. Due to nationalisation of tribal lands, livestock herds are now unrestricted in their grazing area leading to significant ecological damage.

The following section describes current and potential future methods for building resilience in Dhofar.

4. Projects and next steps

As discussed above, biocultural diversity in Dhofar is disappearing because of the many disturbances it has faced in recent years. Recovery from these disturbances sometimes requires intentional intervention to build resilience.

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Atlas

In Dhofar today, there is a significant generational divide due to the rapid development in the past 50 years. This disconnect is not unique to the situation in Dhofar, it is a common result of rapid social and cultural changes. Another region facing an extreme level of inter-generational disconnect is the Inuit population in northern Canada. In Nunavut, Canada this disconnect has partly been bridged by building cybercartographic atlases – collections of digital resources on topics ranging from historical events to sea ice observations (Taylor 2019). These atlases were developed by outside researchers who then trained young researchers to work with local Elders to digitise the knowledge about the land. The digital atlases often evolved into something pragmatic for the community they were built for. One is now a social media platform allowing people to track sea ice, wildlife sightings, hunting journeys, etc. (https://siku.org/) Others have become archival websites with histories, documentation, and sound files (see for ex.: https://inuktutlexicon.gcrc.carleton.ca/index.html; https://clyderiveratlas.ca/index.html). Building an atlas could be a way of putting the traditional knowledge into a format that is more accessible to younger generations in Dhofar thereby mitigating the loss of the knowledge and the languages. There has been interest expressed in Dhofar in mapping traditional lands and journeys (Yahya al Mahri, p.c. 2021) and there are already several e-books and digital resources published in Mehri that could be hosted or linked from an atlas.

In Nunavut, the atlases were built on research done in pairs with a high school or college student and an Elder. Outside researchers gave support for the technical aspects of the website as well as research methodology. In Dhofar, youth-elder partnership is already a regular pattern in the local research. Outside involvement would include the initial build of the website and possibly hosting the platform until a suitable web host could be secured locally as well as methodology and technical training for researchers. Outside researchers can also work with the elder population to record their knowledge and with the younger population to digitise and translate the information. Ultimately, the goal is to have any platform sustained and used by the people of Dhofar and al Mahrah so that it can grow into a useful tool for sustaining the biocultural diversity of the region.

An online atlas could be an important conservation tool for both the ecosystems as information about them can be easily shared and accessed, and for the languages and cultures as it could host links and files of recordings of spoken language and traditions. As the community develops the atlas, it can become something truly local.

Education system

Another more long-term project for biocultural sustainability is through the education system. Today, primary education is solely available in Arabic for

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Dhofari children. Including the traditional languages in the curriculum, either as the language of instruction (LOI) or as an elective subject would increase the use of the languages and their prestige. Using traditional languages as LOI in primary schools has been successful in other areas of the world such as Mali. It has improved education outcomes for primary-aged children including increased pass-rates and lower drop-out rates (Bender 2006; Canvin 2015; USAID 2021). Increasing language use among the younger generation will also help with knowledge transfer as children will be more able to communicate with their elders. It will not guarantee improved knowledge transfer but will be a step toward removing a linguistic barrier.

To implement this resilience strategy, curriculum development and teacher training are also required. This could be begun at post-secondary educational institutions in Salalah.

Traditional knowledge in conservation planning

In writing about biocultural sustainability, Maffi and Woodley (2012) state that one characteristic of effective biocultural conservation projects is implementing traditional knowledge in resource management programmes. This characteristic can be applied to current adaptations in Dhofar such as adapting to the nationalised tribal lands.

In the past, Dhofari resource management was negotiated at the tribal level meaning that there was some control over the number of livestock grazed in each area. Simply reinstating tribal boundaries would lead to increased conflict, but having the knowledge of what the land sustained in the past could inform what kind of limits could be imposed on the same areas today. This adaptation would not erase the traditional institutions but would also not entirely remove the government's imposed changes that helped end the Dhofar War.

Other avenues for applying traditional knowledge include urban and transport planning. This would help mitigate the ecological impact on areas that are vulnerable to disruption or that house important flora or fauna. The knowledge of which areas these are is held by those who depended on the ecosystem for survival and is very local. Again, tribal boundaries could be a way of dividing areas by population and expertise. Further surveys exploring the knowledge held by various tribes would be a good way to open this discussion.

5. Conclusion

Biocultural diversity faces disruption as a matter of course. Sustainability projects that don't have management of these disruptions as a central tenet to their methodologies tend to fail (Titon 2016). Instead, sustainability should be achieved by building resilience through directing adaptations to these

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disruptions toward sustainability (Titon 2016). Pretty et al. (2009) describe threats to diversity and how they affect biological and cultural diversity. Section 2 examined this list as indications of what type of disruptions biocultural diversity might face and how these disruptions are manifested in Dhofar. From there, current adaptations were analysed for their sustainability. Section 3 described necessary attitudes for resilience to be possible. Section 4 discussed current and potential methodologies based on the history and culture of Dhofar. Emphasis on communication and accessibility of the ecological knowledge will be necessary for further sustainability in adapting to disturbances to the biocultural diversity. “”

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