Somaliland Biodiversity Foundation

After the rains

Helen Pickering

November 2017 Newsletter

Featured Species

Kalanchoe marmorata

Mantarar or Matarar

Kalanchoe marmorata [Mantarar, Matarar] is a thick leaved succulent native from the Horn of Africa to central and western Africa. It makes a great ornamental houseplant. In the wild or when grown with minimal water, it produces a few pale leaves with conspicuous markings and, rarely, a flowering stalk. When grown in a pot and watered occasionally, it produces more

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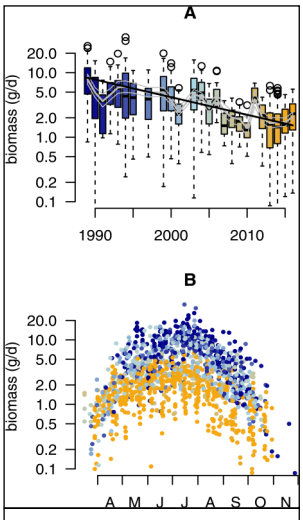
Biodiversity Monitoring

Biodiversity monitoring involves recording data about organisms, habitats, or ecosystems over time. Monitoring is used to find out whether and how a system is changing, help understand its changes, and/or help evaluate the effect of different activities in achieving results. The methods used can be simple so long as the same methods are used each time. Monitoring can also be used to teach numeracy, record keeping, methods of summarizing data, and the use of data to support a recommendation.

Last summer, monitoring data made the headlines in several news outlets, such as The Guardian and Business Insider. Amateur entomologists [people who study insects] had recorded the weight of flying insects caught at several sites in Germany. Their records showed that the weight of insects collected had dropped 76% over the last 30 years. This huge drop is of concern because flying insects are important pollinators, prey, and predators in most ecosystems. To make matters worse, the insect traps were in nature reserves.

Trap for flying insects.

The study showed how valuable information from non-professionals can be. The decline was discovered because simple data (weight of insects caught) were recorded in the same way for several years. Some of the people involved later learned to identify the insects but the headlines came from the simple data, the weight of insects caught.



The data (from article)

In 2018, SBF and the University of Hargeisa will set up a flying insect monitoring site on campus and use it to develop and evaluate standard instructions, in English and Somali, for collecting data. We shall also develop protocols for other kinds of biodiversity monitoring. Our long term goal is to establish monitoring sites at several locations in Somaliland and use them to increase the ability of Somaliland's citizens to contribute information about the country's biodiversity while improving their own skills. Let's hope that, 30 years from now, the headlines read "Somaliland's Biodiversity has increased!"

Photographing Plants in Somaliland

Hagebo Mountains— area that was flooded in May

Helen Pickering

In September, Helen Pickering, accompanied by Abdimajid Elmi, a recent graduate in Environmental Studies from the University of Hargeisa, spent just over three weeks collecting and photographing flowering plants for a *Guide to The Wild Plants of Somaliland.* It is a requirement that foreigners travelling outside of Hargeisa be accompanied by a member of the Special Police Unit, many of whom have considerable knowledge and experience of the countryside. In this instance our security guide became an enthusiastic and very helpful member of the team.

For various reasons travel to the Sanaag area, which includes the floristically unique region of Erigavo and the Daalo mountains, was not possible. They therefore concentrated on Central Somaliland with visits to Berbera (3 days), Boorama (1 day), Sheikh (2 days), Burao (1 day), south of Hargeisa as far as Salahlay (1 day) and one day looking at vegetation between Burao and Hargeisa via Oodweyne. In total 78 plant specimens were collected and dried for the University of Hargeisa's Biodiversity Museum, where they will be curated by Faisal Jama. Duplicates were taken, with permission of the Ministry of Environment and Rural Development, to the Royal Botanic Gardens, Kew in London for identification. An additional 54 plants were collected and identified for inclusion in the book, some of these were Euphorbias or Aloes which, under the Convention on International Trades in Endangered Species, cannot be sent out of the country of origin for identification .

It was surprising how little native vegetation was seen along the coast east of Berbera, *Prosopis juliflora* having out competed local coastal plants. Further from the coast, along a wadi leading to hot springs Biyo Guure, a number of small native plants were found clinging to rocks and in the spaces between the hot streams. On the return from Berbera a side trip was made up Hagebo mountain (illustrated with rain water on top in the previous newsletter). It was surprising to find almost no vegetation at the top, which was covered in volcanic rock (see above).

The next day was spent driving to Boorama. The surrounding area was noted for the very green surroundings with cultivation starting almost immediately outside Hargeisa, then reverting to dry sandy/rocky pastoral lands until sorghum fields began to dominate again before Boorama. The fallow areas between the cultivated fields appeared to be mainly filled with *Heliotropum* intermixed with small amounts of *Parthenium*.

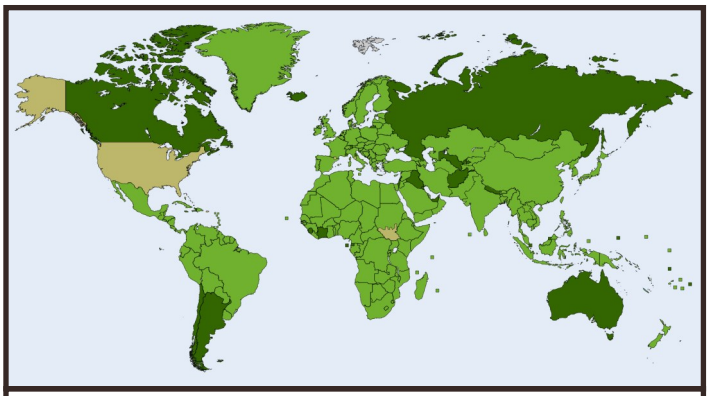
The route to Sheikh included a short cut from the Berbera road to the Sheik road via Lasso Dawaco where a number of small farms, growing vegetables or papaya, are interspersed with pastoral land. The hills surrounding Sheikh were heavily grazed by goats, but to the south west there were a number of small farms growing sorghum or Khat that stood out as oases of greenery. Between Sheikh and Burao we came across a number of desert adapted plants such as *Chenopodium*. The southern route from Burao to Hargeisa was very flat and dry with the large dam in Haro Shiikh being empty. The terrain south of Hargeisa towards the Ethiopian border was also flat and dry so very few plants were collected on these last two segments.

Helen Pickering

Prosopis juliflora, an invasive species in Somaliland.

J.M. Garg, license CC-BY-SA

Convention on Biological Diversity



Parties to the Convention on Biological Diversity (CBD). Light green—parties to CBD and Cartagna Protocol; (CP) dark green—parties to CBD; yellow green not a party to either CBD or CP.

The objectives of the **Convention on Biological Diversity** (CBD) are 1) conservation of biological diversity; 2) sustainable use of its components; and 3) fair and equitable sharing of the benefits arising from a country's biodiversity. Responsibility for managing a country's own biodiversity remains with that country but parties to the CBD must ensure "that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction". Today, 196 countries are parties to the CBD.

The CBD has led to increased efforts to document, monitor and protect biodiversity. It has not prevented all biodiversity loss but it has encouraged many countries to improve their laws and regulations relating to biodiversity. The **Cartagena** and **Nagoya Protocols** were developed later to clarify parts of the CBD. The **Cartagena protocol** addresses the handling, transport, and use of living organisms modified using modern biotechnology. The **Nagoya Protocol**, which concerns access to a country's biodiversity and its potential benefits, is of greater interest to the Somaliland Biodiversity Foundation (SBF). This article addresses the Nagoya Protocol. The **Aichi targets** will be discussed in the next newsletter.

The **Nagoya Protocol** affects biological material being taken out of a country. It does not forbid doing so, merely requires that it be done in a way that conforms to the CBD's objectives. There are many ways this can be accomplished. Some countries require people wishing to take back non-commercial biological organisms or products to acquire a collecting permit first. This can, but need not be, both time-consuming and expensive. Countries can also ask people when leaving, whether citizens or not, whether they are taking any such products, and if so, to show they have permission to do so. Implementing such procedures requires that appropriate legislation be in place.

Many countries regulate importation of biological materials, primarily to keep out diseases and invasive species. Because of the Nagoya Protocol, some also require importers to show they had permission to take out such items. That is why, before leaving Somaliland, Helen Pickering divides her collections into two sets and submits a list of the specimens she is taking to the Royal Botanic Gardens, Kew to Somaliland's Ministry of Environment and Rural Development for approval. The "top" set of specimens remains in the Biodiversity Museum of the University of Hargeisa; the other set, with the export permit, goes to Kew for identification and study by its scientists. Somaliland benefits from the knowledge of scientists at Kew; Kew benefits by having access to a wider spectrum of collections from Africa.

Clearly, a country should not demand that specimens (or living organisms) be left in the country if it cannot ensure their care. It could forbid all collecting but that would make it impossible to build knowledge and/or encourage smuggling. A better alternative is to ask that a sample of the specimens removed be returned when there is appropriate housing. That is why SBF, the University of Hargeisa, and the Ministry of Environment and Rural Development are planning to expand the museum's scope as finances permit. Insects will be added in 2018.

Counting Somaliland's species

How many species does Somaliland have? It is difficult to answering this question. The first problem is that the number of species known to be in a country depends on how much scientific collecting has taken place there; a second problem is finding what is known. Another is that there are known to be many species that have not yet been described.

For vascular plants and birds in Somaliland, there are two recent summaries that make it possible to extract counts for Somaliland: the *Flora of Somalia* (Thulin 1993-2006) and *Birds of Somalia* (Ash and Miskell 2013), respectively. They show Somaliland as having 1769 vascular plants species and 471 bird species. These numbers will increase with time. Indeed, SBF sponsored collecting has already added a few plant species to those reported for Somaliland n the *Flora of Somalia*.

GLOBAL DATABASES

Global databases are another source of information. Unfortunately, the country names they use are those of countries recognized by the United Nations. This means they can enable finding our information for the combined area of Somaliland and Somalia (S+S).

The **Global Biodiversity Information Facility** (GBIF) has the most comprehensive database for many countries. GBIF provides free access to records from natural history collections and surveys from the whole world. The basis of information can be a good image. The problem is that most biodiversity museums are a long way from completing conversion of their specimen records to an appropriate digital format (digitizing) and some are not yet providing their digital records to GBIF. Despite this, GBIF is the best source of information on species diversity for most countries.

On November 5 2017, GBIF had over 873 million records, 52,575 from Somaliland+Somalia (S+S) (link is to download). They were of different groups: animals (32852), plants (14687), chromista (2905); bacteria (352), fungi (95), protozoa (15); SAR (3) (links are to Wikipedia descriptions of the groups concerned) .

Of the GBIF S+S records, 39,805 (76%) had a species name. The number of different species for S+S was 6,999.

Most plant records in GBIF for S+S, 14,295 (97%), were of vascular plants. They represented 2,776 species, many fewer than the 3175 reported in the *Flora of Somalia* undoubtedly for the reasons given above.

The next most abundant categories were birds (7558) and fish (7695). The bird records represented 664 species, slightly more than the 654 Ash & Miskell reported for S+S, possibly because bird records are often reports of observations by qualified individuals, not specimens.

The GBIF fish records for S+S represented 714 species., most of which were collected in the Indian Ocean. The number is somewhat lower than the 838 reported by Fishbase, a specialized global database, for S+S. Clearly Fishbase has access to records not currently shared with GBIF. A similar situation exists for reptiles. GBIF lists 199 species for S+S but the Reptile database lists 239. There were 161 mammal records in GBIF

UNDERREPRESENTED AND OVERLOOKED SPECIES

The GBIF S+S records are very poor for two groups: insects and fungi. Based on global estimates, each of these groups should make up about 40% of the species in a region but insects made up only 11% of the species represented by the S&S records in GBIF and fungi less than 1%.

There were 161 mammal species in the GBIF list but none of four common species, *Homo sapiens* (humans), *Canis lupus familiaris* (domestic dogs), *Camelus dromedarius* (camel), and *Capra aegagrus hircus* (domestic goats). We often forget that we humans are an integral part of the ecosystems where we live. Indeed, we have more impact on the ecosystems that support us than any other species. It is up to us to help them continue to do so.

Two overlooked species: *Canis lupus familiaris* and *Homo sapiens*

Marine Pollution

Oil washed on shore at Batalaale Beach, at Berbera. Photographer: Mustafe Jirde.

On November 8, the SomalilandInformer published an article by Sharmaarke Abdi Musse drawing attention to the impact of sea pollution on marine biodiversity. The pictures accompanying the article (see above) showed how ugly such pollution can be but, as Sharmaake pointed out, the ugliness is more than visual. Oil, sewage, plastics, and other garbage in the world's seas and oceans affects all marine organisms, including the shellfish, shrimp, and fish people eat. In 2016, the Scripps Institute found toxic pollutants in fish from throughout the world's oceans. The amount present varied enormously but was significant. The pollutants reduce the ability of animals, including humans, to expel toxins from their bodies.

More recently, scientists found that all crustaceans sampled from the deepest part of the ocean had man-made fibres in their stomach. Such fibres have no nutritional value. They make the animal feel full but they do not provide the nutrients required for normal growth and reproduction. Lower reproduction rates translate into lower harvests. The primary reason for the recent drop in the global fish harvests is overfishing but lower rates of maturation and reproduction contribute.

The good news is that the level of toxins in fish populations has been decreasing since the 1980s. One reason for the change was increased awareness of how persistent many manmade organic compounds are. This led to preparation of the Stockholm Convention which now has 150 parties (not, alas, the US). Clearly, increasing awareness and international treaties can have an impact.

Where do the toxins and plastics in the seas and oceans come from? People – and almost all of it from land use. Yes, dumping by ships is a problem but most of the oil and garbage in the world's seas arrives there from the land, being blown off shore by winds, carried off shore in streams, carried out by pipes, and simply thrown out on beaches. What can be done?

First, we need to help develop good disposal facilities, facilities that ensure that the waste put in them cannot blow away nor leach toxic compounds into the soil. Second, each of us can try to reduce our use of plastics because they take a very long time to degrade. We can also make a practice of disposing of our personal garbage carefully, whether it be a drink container or waste oil.

The Ocean Conservancy is an organization dedicated to cleaning up the world's oceans. One way to help in the effort is by starting the first coastal clean-up around the Horn of Africa (link is to directions for enrolling). An additional step would be to take photographs of beach pollution, recording the date and exact location. Such information can be archived so progress - or lack thereof – can be demonstrated.

Kalanchoe marmorata (cont.)

and greener leaves with no markings and a flowering stalk. If the flowering stalk becomes too heavy, it will bend over but, when it reaches a support, whether the ground or the edge of a pot, it will grow skyward again.

To grow *Kalanchoe marmorata*, just pick a plantlet from the base of a well-developed plant and put it in a pot. Water occasionally, but do not overwater. The plant show on this page looked like the plant on page 1 in its native habitat.

Ahmed Awale

Cultivated plant and flower of *Kalanchoe marmorata*

Plastics - miraculous materials that last too long

Plastic refers to material consisting of any of a wide range of synthetic or semi-synthetic organic compounds that are malleable and so can be moulded into solid objects. Plastics are typically organic polymers of high molecular mass, but often contain other substances. Most are derived from petrochemicals but some are made from renewable materials. Because of their low cost, ease of manufacture, versatility, and imperviousness to water, plastics are used in an enormous and expanding range of products, from paper clips to medical equipment and spaceships (Wikipedia).

Despite their many virtues, there is a huge problem with plastics: they are not or only slowly biodegradable (see table). Some can be recycled but this is costly; a few others can be degraded with microorganisms. But the vast majority of plastic ever made is still around. How much is that? About 8.3 billion metric tons. Of that, about 8 million tons (estimates vary from 4.75 – 12.7 million tons) is in the ocean. Today the weight of plastic in the open ocean is greater than the weight of plankton, the floating organisms that form the base of marine food chains. Even more alarming is the estimate that, by 2050, the weight of plastics in the ocean will be greater than the weight of fish.

Object	Decomposition Time
Styrofoam container	> 1 million years
Plastic jug	1 million years
Extruded polystyrene foam	> 5000 years
Aluminum can	200-500 years
Disposable diapers	550 years
6-bottle collar	450 years
Tin can	90 years
Leather shoes	45 years
Wool socks	1 year
Paper bag	1 month
Banana peel	3-4 weeks

Decomposition times for common objects

What to do? There is no easy solution. Many of the devices we use, from water containers to computers, satellites, and medical equipment, rely on plastics. As individuals, we can select non-plastic alternatives if they exist and reuse plastic items multiple times. We can also encourage development and use of plastic disposal sites that prevent their contents from being blown away. This would concentrate the area degraded, protect the oceans, and make it easier to take advantage of new recycling opportunities being developed such as their use in road building. This use is being evaluated in Himachal Pradesh, India .as explained in this video. It also generates paid work for local people according to an article in the Guardian. Another source of ideas is Inspir'actionNews.com

Road made with waste plastic in India.
Source: Inspir'Action.News.com

Another possibility (and probably more expensive) is the use of plastics in modular road development and maintenance. In either case, the longevity of the road is probably dependent on preparation of good road-bed but it seems an interesting approach to explore. Another approach being tested is encouraging growth of microbes that degrade plastics.

Despite all the ideas, the best approach is to minimize plastic use whenever feasible. It is not always feasible.

For another interesting recycling idea, use this link to the use of cardboard to create insulated roofing materials.

News from the Museum

Faisal Jama Gelle. This summer, the museum welcomed Faisal Jama Gelle as museum assistant. He has a B.Sc. in Agriculture from Amoud University, an M.Sc. in Agriculture Extension from Hajee Mohammad Danesh Science & Technology University, Bangladesh. He has also worked in the Somaliland Agricultural Society and the Somaliland Ministry of National Planning and Development conducting surveys, offering training, and designing courses. Since his appointment, he has been familiarizing himself with the museum's resources, explaining its function to students and others who stop by, and assisting professional visitors interested in its facilities. He has also taken on primary responsibility for translating the newsletter into Somali. In 2018, he will be adding specimens to the collection and developing, with Mary Barkworth, educational resources about plants in both English and Somali.

Visitors. Several students and faculty of the University of Hargeisa have stopped by the Museum to find out more about it. In addition, it has been visited by individuals participating in workshops offered on campus, by scientists from the Czech Republic, and Helen Pickering.

The University also sponsored a workshop, led by the Czech scientists that introduced participants to snakes, scorpions, and amphibians of Somaliland.

Collections. Before leaving Somaliland, Helen Pickering deposited voucher specimens for her photographs in the museum. These will be prepared for deposition in 2018 and the collection data shared via OpenHerbarium.

Flood. In July, torrential rains caused a flood in the museum. Fortunately, only two specimens were damaged but a box of cardboards used for plant collecting was soaked. The university moved swiftly to address the problem.

New Directions. In 2018, the museum will start housing insects. This is possible thanks to last year's generous donation by Boswellness. Christy Bills, an entomologist at the Utah Museum of Natural History, who helped select the equipment and has agreed to assist in identification. We thank both Boswellness and Christy for their support.

The Museum Online. The museum shares information about species and its holdings through OpenHerbarium and OpenZooMuseum. Since May, Mary has added descriptions and images of several taxa to these sites. Most animal images come either from Tomáš Mazuch's facebook postings (with his permission) or Wikipedia. If anyone in would like to assist in adding images, Faisal and I will be happy to show you how in 2018!

The two web sites were moved to a server managed by iDigBio in early December (use links in above paragraph). They now run faster and have additional capabilities that will become more useful as distribution records are added.

Symbiota, the program that runs the "Open" sites cannot serve standard identification keys so those in the *Flora of Somalia* are being posted to KeyBase. The names are being linked to taxon pages in OpenHerbarium. It is a slow process. KeyBase also allows filtering keys. For instance, by selecting the filter "Somaliland", only statements that lead to taxa found in Somaliland are shown.

Much of the information for the articles in this newsletter came from websites. Links are built into the text for the major sources. They are also listed below, in order of citation, for the sake of those reading the print version. One reason this issue is late is that the web has so much to offer. I find it hard to resist reading "just one more site". It is that which led to the discovery of the article on using cardboard to create insulated, waterproof roofs.

Starting with this issue, the author's name will be placed at the end of articles prepared by others. If anyone wishes to submit an article, I would be happy to consider it for publication. Articles without an author's name were prepared by me.

Mary Barkworth

Sources of information and images

Carrington, D. 2017. Warning of 'ecological Armageddon after dramatic plunge in insect numbers; https://www.theguardian.com/environment/2017/oct/18/warning-of-ecological-armageddon.

Brueck, H. 2017. A 27-year study found the amount of insects flying in the air has declined 75% — but no one knows why http://www.businessinsider.com/germany-insect-population-flying-bugs-climate-change-pesticides-population-decline-2017-10

Hallman, C.A. M. Sorg, E. Jongeijans, H. Siepel, N. Hofland, H. Schwan, W. Stenmans. A. Müller, H. Sumser, T. Hörren, D. Goulsen, H. de Kroon. 2017. More than 75 percent decline over 27 years in total flying insect biomass in protected areas. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0185809 This article was the source for both illustrations.

Convention on Biological Diversity. Home page. https://www.cbd.int/. For the map, https://www.cbd.int/countries/

Cartagena Protocol. Home page. http://bch.cbd.int/protocol

Nagoya protocol. Home page. https://www.cbd.int/abs/

Aichi Biodiversity Targets. Home page. https://www.cbd.int/sp/targets/

Global Biodiversity Facility. http://gbif.org

GBIF data downloads:

GBIF.org (5th November 2017) GBIF Occurrence Download https://doi.org/10.15468/dl.hzc5ug (Arthropods and chordates)

GBIF.org (5th November 2017) GBIF Occurrence Download https://doi.org/10.15468/dl.fwlg4h (All taxa)

Wikipedia links

Chromista https://en.wikipedia.org/wiki/Chromista

SAR https://en.wikipedia.org/wiki/SAR_supergroup

Reptile database http://www.reptile-database.org/

Fishbase http://www.fishbase.org/search.php

Sharmaarke Abdi Musse. 2017. Growing sea pollution in Somaliland: A critical problem in the lives of the People and Biodiversity. http://www.somalilandinformer.com/somaliland/growing-sea-pollution-in-somaliland-a-critical-problem-in-the-lives-of-the-people-and-biodiversity/

Aguilera, M. 2016. Study Finds Toxic Pollutants in Fish Across the World's Oceans. https://scripps.ucsd.edu/news/study-finds-toxic-pollutants-fish-across-worlds-oceans.

Aguilera, M. 2016. Pollutants in Fish Inhibit Human's Natural Defense System. https://scripps.ucsd.edu/news/pollutants-fish-inhibit-humans-natural-defense-system

Embury-Dennis, T. 2017. Sea creatures in deepest part of ocean found to have plastic fibres in their stomachs for the first time. http://www.independent.co.uk/news/science/sea-creatures-manmade-fibres-sea-pollution-deep-ocean-scientists-mariana-trench-newcastle-university-a8058106.html

Stockholm Convention. Home page. http://chm.pops.int/

Ocean Conservancy. Home page. https://oceanconservancy.org/

Coastal cleanup. Home page. https://oceanconservancy.org/trash-free-seas/international-coastal-cleanup/

Plastic. Wikipedia explanation. https://en.wikipedia.org/wiki/Plastic

Mosbergen, M. 2017. Scientists Have Figured Out How Much Plastic We've Made Since 1950. It's Not Pretty. World News. https://www.huffingtonpost.com/entry/plastic-produced-1950s-study_us_59704ca5e4b0110cb3cba57e

Bharadwaj, A. 2010. Eco-friendly plastic roads in Himachal Pradesh. http://www.dnaindia.com/india/report-eco-friendly-plastic-roads-in-himachal-pradesh-1383591

Subramanian, S. 2016. Plastic roads: India's radical plan to bury its garbage beneath the streets. The Guardian. https://www.theguardian.com/sustainable-business/2016/jun/30/plastic-road-india-tar-plastic-transport-environment-pollution-waste

Inspir'ActionNews.com

Plastic Road: a revolution in building roads. https://www.plasticroad.eu/en/

Lorch, M. 2010. Scientists Just Discovered Plastic-Eating Bacteria That Can Break Down PET. Science Alert. https://www.sciencealert.com/new-plastic-munching-bacteria-could-fuel-a-recycling-revolution

BBC. 2017. Waste cardboard is transforming India's slums. http://www.bbc.com/news/av/business-41945368/the-recycled-roofing-system-improving-india-s-slums

OpenHerbarium. http://openherbarium.org/portal/index.php

OPenZooMuseum. http://openherbarium.org/zoo/portal/index.php

iDigBio. http://iDigBio.org

Keys from *Flora of Somalia*. http://keybase.rbg.vic.gov.au/projects/show/32