INTRODUCTION: DEFINITIONS AND TODAY’S SITUATION

Language ecology/ecolinguistics
Language plus ecology = language ecology, linguistic ecology, ecolinguistics?
Today's interpretations of what language ecology is range widely. Many researchers use ‘ecology’ simply as a reference to ‘context’ or ‘language environment’, to describe language-related issues embedded in (micro or macro) sociolinguistic, educational, economic or political settings rather than de-contextualised. Here ‘ecology’ has often become a fashionable term for simply situating language or language study in some way, i.e., it is a metaphor. Others have more specific definitions and sub-categories (e.g., articles in Fill & Mühlhäusler 2001; Mufwene 2001; Mühlhäusler 1996; 2003).

In language ecology or linguistic ecology the ecological aspects are emphasised, just as language sociology is more sociologically oriented. On the other hand, ecolinguistics seems to draw more on linguistics, analysing how languages and their users treat and analyse ecological issues (see Stibbe, 2015, and this volume), just as sociolinguistics often is more linguistically oriented than language sociology. The two pioneers, Jørgen Chr. Bang & Jørgen Dørør, working with ecolinguistics since the early 1970s, defined ecolinguistics as follows in 1993. “Ecolinguistics is the part of critical, applied linguistics concerned with the ways in which language and linguistics are involved in the ecological crisis. Ecolinguistics is a critical theory of language/linguistics and is both partisan and objective” (see http://www.jcbang.dk/main/ecolinguistics/index.php).

In this article (just as in Phillipson & Skutnabb-Kangas, this volume), we endorse Wendel's definition: “The ecological approach to language considers the complex web of relationships that exist between the environment, languages, and their speakers” (Wendel 2005: 51). We understand ‘environment’ here as not only the social (including linguistic) but also the physical environment. We use ecology in its literal sense (i.e. not merely as a metaphor), to refer to the biological relationships of organisms (including human beings) to one another and to their physical surroundings. There has been a tendency of many sociolinguists to pay only lip-service to this literal sense of ‘ecology’, and to focus only on social concerns. They see the ‘eco-‘ in ecolinguistics/language ecology as a relationship within and between various languages, speakers of these languages, and their sociocultural and economic contexts.

Linguistic diversity
What is linguistic diversity or language diversity? The term language is extremely imprecise. One cannot define what “language” is if one does not analyse those power relations which are decisive for whose definitions are valid about whether something is a language or not, and why it is this definition that prevails (see Skutnabb-Kangas 2000, Chapter 1, for a discussion of what a language is; see also Macaulay 1997). Borders of a concept are often in the perceptions of the observer rather than in the characteristics of the observed: languages are, above all, protean. One example of the porous borders is the 17th edition of Ethnologue, the most comprehensive global source list for (mostly oral) languages (Lewis et al. 2014). It lists 7,102 languages, but
over 40,000 alternative names or labels for various languages. The existence and countability of languages has also been questioned, albeit on somewhat shaky grounds (e.g. Makoni & Pennycook 2007).

Even if we knew what a language is, we certainly have extremely unreliable figures for the number of speakers for most of them, including the largest ones, where the differences of estimates of the speakers of the same language may be tens of millions (see Skutnabb-Kangas 2000). The concepts used, language, and “native” speakers (not to mention mother tongues), are relational, not characteristics of people; they are social constructs, not inherited givens; they are hybrid and nomadic, dynamic and changing, not static; people may claim several of them at the same time and be multilingual and multicultural, and multiethnic, or ‘bicountrial’. All of them play ever-changing roles for people's multiple identities, and are variously focussed and emphasized in various situations and at various times; their salience is always variable. All identities, not only language-related ones, are of course constructed to the extent that we are not born with identity genes. Even in cases where we are talking about phenotypically visible genotypical features like skin colour, very obviously the way these features are interpreted are social constructions, not innate.

If we could define ‘language’ and ‘native speaker’, we might then equate the relative linguistic diversity of geographical units, for instance countries/states, with their linguistic richness— the number of languages spoken natively in the country. The most linguistically diverse countries would then be the ones with most languages. Papua New Guinea, with its 838 languages would be the uncontested world champion.

Another way of measuring linguistic diversity is by Greenberg’s diversity index, which is “the probability that any two people of the country selected at random would have different mother tongues (Lieberson et al. 1981). The highest possible value, 1, indicates total diversity (that is, no two people have the same mother tongue) while the lowest possible value, 0, indicates no diversity at all (that is, everyone has the same mother tongue)”; Lewis et al. 2014, explanation to Table 8 at http://www.ethnologue.com/17/statistics/country/.

A third way to measure linguistic diversity is to combine measures of language richness (the number of languages) with language evenness (the relative distribution of speakers among a given set of languages under consideration). This is the approach Harmon and Loh used in their Index of Linguistic Diversity (2010).

All these ways of measuring linguistic megadiversity can be contested. Clinton Robinson (1993), for example, argues that the most diverse country is not the one with the largest number of languages, but the one where the largest linguistic group represents the lowest percentage of all linguistic groups. Thus, there can be a very big difference in the list of the world's linguistically most diverse countries, depending on which of these measures we use (although at a national level, there is no doubt that Papua New Guinea ranks first).

The first sociolinguistic attempts to explore linguistic ecology pleaded for linguistics to be grounded in societal context and change. Trim 1959 and Haugen's seminal 1971 article entail multidisciplinarity and build on multilingual scholarship (of the works cited by Trim, eight are in German, six in English, and four in French; academia has become more monolingual in globalization processes). Haugen refers to status, standardization, diglossia, and glottopolitics, but not to language rights (the concept did not exist then – see Skutnabb-Kangas 2007).

The first serious academic discussion about threats to linguistic diversity was started by Michael Krauss in the journal Language in 1992, who warned that looming
language extinctions were a major but unappreciated threat to the practice of linguistics itself (for more detail, see below). In the same number of Language, Peter Ladefoged (1992) presented a less worried view. Since 1992, the discussion about language endangerment, and attempts to counteract it, have grown exponentially (Simons and Lewis 2013 provide a summary).

Bearing in mind the intrinsic pitfalls in identifying and quantifying languages, some basics follow about linguistic diversity. There are probably between 6,500 and 10,000 spoken (oral) languages in the world, and a large number of sign languages. Europe and the Middle East together account for only 4% of the world's oral languages (275 according to Krauss 1992: 5). The Americas (North, South and Central) together account for around 1,000 of the world's oral languages, 15%. The rest, 81% of the world's oral languages, are in Africa (30.2%), Asia (32.4%) and the Pacific (18.5%), all according to Lewis et al. 2014, Table 1).

Eleven countries in the world have more than 200 living languages each, accounting for more than half the world's languages, a total of 4,705 languages (counted from Table 7 in Lewis et al. 2014). Another ten countries have more than 100 languages each, a total of 1358. These top 21 countries, just over 10 percent of the world's languages, with 6063 languages, would account for some 85.4 percent of the world's languages.

The top 10 oral languages in the world, in terms of number of mother tongue speakers are according to the 17th edition of the Ethnologue, Chinese languages, Spanish, English, Hindi, Arabic languages, Portuguese, Bengali, Russian, Japanese and Javanese. The figures have changed in the last decade (see Skutnabb-Kangas, Maffi & Harmon 2003). They represent much fewer than 1% of the world's (oral) languages, but account for around half of the world's population. There are 88 languages with more than 100 million speakers. Fewer than 300 languages are spoken by communities of 1 million speakers and above. Some 88% of the world’s languages are spoken by fewer than 1 million speakers and most of the Sign languages are spoken by communities of less than 10,000 speakers. Some 1.537 languages (21.6%), are spoken by communities of fewer than a thousand speakers.

Languages are today being killed at a much faster pace than ever before in human history. As a consequence, linguistic diversity, regardless of how we define it, is disappearing. Fewer new ‘languages’ are being created to replace them, regardless of how ‘languageness’ is defined.

**Biodiversity**

Although the variety of Earth’s plants and animals has been part of people’s awareness for thousands of years, systematic consideration of this diversity as an organizing principle for nature conservation only arose in the 1970s and 1980s. The term “biodiversity,” which is simply a contraction of “biological diversity,” originated in the mid-1980s and quickly became a focal point for conservationists. A hallmark of the concept of biological diversity (as opposed to earlier formulations such as “natural diversity”) is that it is expressed in a hierarchy of nested scales, from genes to species to ecosystems. Actually, these three levels can all be referred to the central concept of species: genetic diversity is that which is within species, species diversity is that

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1. These are Australia (244 languages), Brazil 288, Cameroon 281, China 301, Democratic Republic of the Congo 215, India 454, Indonesia 707, Mexico 288, Nigeria 529, Papua New Guinea 838, and the USA 420. Knowing some of these countries certainly testifies to the difficulty and unreliability of counting languages…
among species for a given area, and ecosystem diversity is the variety of types of species habitat across a landscape.

Just as the number of languages has been used as a proxy for linguistic diversity, the number of species has been used as a proxy for biodiversity. But we have very little solid knowledge of these numbers, and the range of estimates is far broader than that of the number of languages. Figures of between 5–15 million separate species are considered probable (Harmon 2002: 37). But figures as low as 2 million and as high as 50 million (Maffi 2001: Note 1) or even 100 million have been mentioned, although recent studies suggest that counts in the multiple tens of millions are too high (Stork et al. 2015). The highest figures are based on the estimate that most of the world's species (maybe up to 90%, Mishler 2001: 71) have not yet been “discovered”, i.e., named and described by (mostly Western) scientists; only some 1.5 million different species (from plants and animals to fungi, algae, bacteria and viruses) have so far been identified by natural scientists. Many may become extinct before having been studied at all.

A relatively simple global measure of ecological diversity which corresponds to a linguistic megadiversity list is that of megadiversity countries, Russell & Cristina Mittermeier's (1997) concept. These are “countries likely to contain the highest percentage of the global species richness” (Skutnabb-Kangas, Maffi & Harmon, 2003, 16; see also Conservation International at http://www.conservation.org/xp/CIWEB/publications/videos/index.xml).

Researchers have also developed concepts covering other units where there is a high concentration of species. Ecoregions and biodiversity hotspots are important examples. The World Wide Fund for Nature (WWF) defines an ecoregion as follows: “A relatively large unit of land or water containing a geographically distinct assemblage of species, natural communities, and environmental conditions” (quoted from Oviedo & Maffi 2000: 1). The definition might seem fairly vague, but this is a necessary result of trying to capture the fact that for conservation work (and in general too) species and their living conditions have to be seen not as isolated but as relational, just as mother tongue and ethnicity are not characteristics of individuals or groups, but are indexical of relations, including power relations, between them and other people. WWF has identified nearly 900 ecoregions. 238 of them have been termed “Global 200 Ecoregions” because they are found “to be of the utmost importance for biological diversity” (Oviedo & Maffi 2000: 1). Most of them are in the tropical regions, just as languages are. Eric Smith's (2001: 107) account based on the 12th edition of the Ethnologue shows that 55.6% (3,630) of the world's endemic languages are in the tropical forest regions.

Another global measure is biodiversity hotspots: “relatively small regions with especially high concentrations of endemic species” (Skutnabb-Kangas, Maffi & Harmon 2003: 55). This concept was created by Norman Myers; see Center for Applied Biodiversity Science, http://www.biodiversityhotspots.org/xp/Hotspots. Using this concept as a benchmark against which to compare language richness, Gorenflo et al. (2014: x) found a “remarkable concordance” in which 70% of the world’s languages are found in the 25% of the planet’s land area that is considered either a “biodiversity hot spot” or a “high-biodiversity wilderness area”.

CRITICAL ISSUES AND TOPICS: LINGUICIDE AND ECOCIDE
Assessments: linguistic diversity
‘In the last five hundred years about half the known languages of the world have disappeared’” according to Hans-Jürgen Sasse (1992: 7). Optimistic prognoses of
what is happening to the world's languages suggest that around the year 2100 at least 50% of today's over 7,000 spoken languages may be extinct or very seriously endangered (with elderly speakers only and no children learning them). This estimate, originating with Michael Krauss (1992) is also used by UNESCO (see, for instance http://portal.unesco.org/culture/en/ev.php-URL_ID=8270&URL_DO=DO_TOPIC&URL_SECTION=201.html, or the position paper Education in a Multilingual World, UNESCO 2003c). UNESCO's Intangible Cultural Heritage Unit's Ad Hoc Expert Group on Endangered Languages (see UNESCO 2003a; see also UNESCO 2003b, c) uses a more pessimistic figure in their report, Language Vitality and Endangerment (UNESCO 2003a). Almost all languages to disappear would be Indigenous languages, and most of today's Indigenous languages would disappear, with the exception of a very few that are strong numerically (e.g., Quechua, Aymara, Bodo) and/or have official status (e.g., Māori, some Saami languages). Simons & Lewis (2013) have added considerable depth to our understanding of global language endangerment by assessing, for the first time, the state of vitality for all of the 7480 languages (both living and extinct) in the latest edition of Ethnologue, using a single 13-point risk-assessment scale called the Expanded Graded Intergenerational Disruption Scales (EGIDS). Although results from different regions varied widely, their overall key finding, that 19% of the world’s languages are no longer being learned by children, is less pessimistic than Krauss’s pioneering estimates.

Nobody knows what will happen to the world's Sign languages. There is today no idea of how many Sign languages there are. The 17th version of the Ethnologue only lists 135 Sign languages (http://www.ethnologue.com/17/statistics/family/) – a veritable underestimation. There are Deaf people everywhere in the world, and where hearing people have developed spoken languages, Deaf people have developed Sign languages. These are in every respect full languages (see, e.g., Lane 1992; Ladd 2003). The World Federation of the Deaf estimates that there are some 70 million Deaf people in the world (http://wfdeaf.org/faq) but they do not even guess how many Sign languages there might be. Only in Aotearoa/New Zealand does a Sign language have an official status similar to the other official languages (in this case English and Māori). In over 20 countries Sign languages are mentioned in the constitution or some other equally official regulations.

Assesments: biodiversity
For some time now, conservationists have warned that we are on the verge of the sixth mass extinction in Earth’s history, the first ever to be caused by human activity. One might reasonably think that such an assertion would be vitiated somewhat by the uncertainty regarding the total number of species. And it is true that we don’t have any real idea of what percentage of Earth’s species are threatened with extinction, since that number depends on how many species there actually are. But the rationale for an impending massive anthropogenic extinction is not based on percentage of loss. Rather, it relies on comparisons of modern (i.e., post-1500) extinction rates with the background rate of extinction, that is, the number of species we would expect to go extinct over some given unit of time if there were no human impacts on the course of evolution. In a recent review article (Ceballos et al. 2015), a team of scientists canvassed a number of studies comparing modern and background rates of extinction, and also made their own calculation, which by design was “extremely conservative” so as to not overstate extinction risks. Using a new estimate of the background rate (from Barnosky et al. 2011) that is twice as high as in most previous studies, Ceballos
and colleagues calculated that, even under the most conservative of assumptions, the average rate of vertebrate species loss over the last century is at least 8 times higher, and perhaps as much as 100 times higher, than the background rate (the variation depends on what assumptions one makes about how to determine whether a species is truly extinct). The authors’ conclusion is stark: “The evidence is incontrovertible that recent extinction rates are unprecedented in human history and highly unusual in Earth’s history. Our analysis emphasizes that our global society has started to destroy species of other organisms at an accelerating rate, initiating a mass extinction episode unparalleled for 65 million years” (Ceballos et al. 2015).

According to conservative (i.e., optimistic) assessments, more than 5,000 species disappear every year; pessimistic evaluations claim that the figure may be up to 150,000. Using the most ‘optimistic’ estimate of both the number of species (the high figure of 30 million) and the killing of species (the ‘low’ figure of 5,000/year), the extinction rate is 0.017% per year. With the opposite, the most ‘pessimistic’ estimates (5 million species; 150,000/year disappear), the yearly extinction rate is 3%. (See Harmon 2002, Maffi 2001, Skutnabb-Kangas 2000 and Skutnabb-Kangas, Maffi & Harmon 2003 for both correlational and causal relationships between the extinction of species and languages). Much of the knowledge of how to maintain biodiversity is encoded in the small languages of Indigenous and local people(s, and it disappears when the languages disappear.

Researchers who use the high extinction rates often also use higher estimates for numbers of species. If the number of species is estimated at 30 million and 150,000 disappear yearly, the rate would be 0.5% per year. Many researchers seem to use yearly extinction rates which vary between 0.2% (‘pessimistic realistic’) and 0.02% (‘optimistic realistic’ − these are our labels).

If we disregard the cumulative effect and do a simplified calculation, according to the ‘pessimistic realistic’ prognosis, then 20% of the biological species we have today might be dead in the year 2100, in ninety years' time. According to the ‘optimistic realistic’ prognosis the figure would be 2%. Optimistic estimates, then, state that 2% of biological species but 50% of languages may be dead (or moribund) in a 100 years' time. Pessimistic estimates are that 20% of biological species but 90% of languages may be dead (or moribund) in ninety years' time. Recent work by David Harmon and Jonathan Loh (2010) in developing an Index of Linguistic Diversity (ILD) provides trend data on linguistic diversity. It measures “trends in the fraction of the total population belonging to each language” (Loh and Harmon 2014: 41) and thus shows how speakers have shifted from smaller to larger languages since the index’s starting point in 1970.

**Biocultural diversity - relationships between linguistic diversity and biodiversity**

Biocultural diversity may be defined as the sum total of the world’s differences, no matter what their origin. It is the variety of life in each of its manifestations— biological, cultural, and linguistic—all of which interact with the planet’s abiotic diversity to form a complex adaptive system that supports life on Earth. In an authoritative short history of the rise of biocultural diversity, Maffi (2005) traces echoes of the concept all the way back to Darwin on the biological side and to Sapir, Whorf, and most especially Kroeber on the anthropological/linguistic side. Writing in 1968, the biologist Raymond F. Dasmann was perhaps the earliest to explicitly advocate for the dual protection of natural and cultural diversity in a conservation perspective. Although his call was not taken up by the mainstream of conservation, specialists in ethnobiology and ethnobotany embraced the basic idea, culminating in the issuance of the Declaration of Belém in 1988 by the International Society of
Ethnobiology, which asserted the existence of an “inextricable link between cultural and biological diversity” (Maffi 2005).

In his pioneering 1992 paper, Krauss explicitly linked the threats to both realms of diversity: “Language endangerment is significantly comparable to—and related to—endangerment of biological species in the natural world” (1992: 4). He also was the first to publish a numerical comparison of the percentage of endangered species with his own “plausible calculation” of the likely “death or doom” of 50%, and as much as 90%, of the world’s languages by 2100 (1992: 7). Krauss’ numerical comparison was very basic; it was amplified considerably a few years later in a pair of companion papers by Harmon. They were the first studies to (1) categorize the world’s languages by the number of mother-tongue speakers, quantifying that most languages are spoken by fewer than 10,000 people (Harmon 1995), and (2) to systematically calculate the spatial congruence of linguistic and biological diversity on a global level (Harmon 1996). The latter study found that 10 of the top 12 “megadiversity” countries for biodiversity (as defined by IUCN, the International Union for Conservation of Nature) are also among the top 25 most linguistically diverse countries. Harmon’s global cross-mapping of languages and higher vertebrate species (see Maffi 1998 for the earliest printed version of this map) identified various countries in Central and South America, central Africa, South and Southeast Asia, and the Pacific as among the most bioculturally diverse on the planet—a finding that was confirmed by later work that found three “core areas” of global biocultural diversity: the Amazon Basin, Central Africa, and Indomalaysia/Melanesia (Loh and Harmon 2005). Several biogeographic factors in high-biocultural-diversity countries/regions could account for these correlations, such as the presence of large land masses with a wide variety of terrain and climate; islands having difficult-to-cross internal geophysical barriers; or tropical ecosystems with many species) (Harmon 1996; on this point, cf. Nettle 1999 where length of mean growing season was found to correlate with linguistic diversity). The main research advances since these early studies have been along three lines.

First, additional studies, several of them more fine-grained, have been done. Some, such as the analysis of cultural and biological diversity in Africa by Moore et al. (2002), and Sutherland’s (2003) global comparison of extinction risks for species and languages, largely confirmed the early correlational findings. Others, however, offered important qualifications; for example, Manne (2003) found that correlations between linguistic and biological diversity held at larger geographic scales within Central and South America but were weaker at finer scales. Further, more recent studies relevant to the relationship of biological and linguistic diversity are reviewed in Gavin et al. 2013.

Second, two separate indices have been developed that bear on the relationship between biological and linguistic diversity. The earlier of the two was an attempt by Loh and Harmon (2005) to measure global biocultural diversity (at the national level) in an integrated way. This Index of Biocultural Diversity (IBCD) uses three related measures: an unadjusted measure of the richness (i.e., total number) of species and languages in a given country, that same measure adjusted for the country’s land area, and that same measure adjusted for the size of the country’s population. It is from this analysis that the three “core areas” of biocultural diversity (referred to above) were derived. Following on to this, the same authors developed an Index of Linguistic Diversity (ILD) which is now used as part of the Biodiversity Indicators Partnership. Globally, the ILD measures trends in the fraction of the overall population belonging to each of the world’s languages. The ILD thus captures the recent general trend in which the world’s largest languages are “cornering the market” as speakers
shift away from smaller ones. When the global trendline of the ILD is superimposed upon that of the Living Planet Index, a well-respected measure of the rate at which biodiversity is declining, the result is astonishing: They track one another almost perfectly, with both falling about 30 percent between 1970 and 2009. This strongly suggests that, today, linguistic diversity is disappearing as fast as biodiversity (Loh and Harmon 2014: 42).

Third, better data-characterization methods, new techniques in tracing the phylogeny of languages, and advanced statistical tests are making the analysis of the relationship between biological and linguistic diversity more methodologically sophisticated. For example, GIS (geographic information systems) technology has been used to create a series of maps that depict overlaps between linguistic and various forms of biological diversity (see, e.g., Stepp et al. 2004). In a groundbreaking study, Gray and colleagues (2009) combined lexical data with new data-base technologies and Bayesian computational phylogenetic methods to work out in unprecedented detail the evolutionary relationships among 400 Austronesian languages. Finally, research is poised to go beyond single-factor correlative studies by using multivariate statistical methods to analyze more than one possible cause of biological/linguistic diversity overlap at a time (Gavin et al. 2013).

How deep is the threat to biocultural diversity? Loh and Harmon (2014) compared the status of and trends in biological and linguistic diversity around the world. Because species and languages are alike in many ways, they used methods originally developed by biologists and adapted them to measure global linguistic diversity. Their analysis shows that at least 25 percent of the world’s 7,000 oral languages are threatened with extinction, compared with at least 30 percent of amphibians, 21 percent of mammals, 15 percent of reptiles and 13 percent of birds.

PARALLELS AND DIFFERENCES BETWEEN THE DIVERSITIES

Reasons for the disappearance of linguistic diversity: linguicide and biodiversity: ecocide

Why are languages disappearing? Obviously it is the languages with fewer speakers which disappear. Most of them are Indigenous/Tribal peoples and minorities and minoritized groups/people (ITMs). There are both push and pull factors involved. Among the push factors, the most important ones have to do with the poor and powerless economic and political situation of people who speak the numberwise small languages; this makes them extremely vulnerable. The regions where they live are often exploited by logging, mining, overfishing, spread of industrial agriculture, exploitation of their traditional medical and other knowledge, etc. Their ecoregions are ruined and they can no longer live off their lands and forests. Many are forcibly moved. The jobs that the big companies promise go to others, not the original inhabitants of the region. Many are forced to seek employment in cities (urbanisation) or even in other countries. Many of the same factors are also responsible for ecocide – this is one of the parallels.

The pull factors are based on several myths. The ITM people are constructed as resourceless, ignorant, backward. Their way of earning their living, their cultures, their knowledges and their languages are stigmatised. The (urban) speakers of bigger, dominant languages are glorified; their life styles, cultures, knowledges, ways of earning their living, their habits, dresses, everything they do, are presented as preferable, more civilised, worth of emulating. The dreams of a better life are connected to becoming like them, speaking and living like them. If only I learn their language and move to the city, then my children become educated, then… There are
sometimes, even often, some benefits connected with the moves, and certainly
knowing a dominant language or even several pays off economically. But here
another myth interferes. People are made to believe in either/or: you have to choose.
If you want to learn the dominant language and culture, it means you have to leave
yours behind. Most ITM children (and their parents) obviously want in their own best
interests to learn the official language of their country. This is also one of the
important Linguistic Human Rights (LHRs) principles (access to state languages) and
implies for ITM speakers the right to become bilingual in their MT/L1 and the state
language. Most children also want to learn English if it is not one of the official
languages, given its current ascendancy as the dominant world language. Of course
we endorse ITMs’ wishes to learn dominant languages, regional, national and
international. But learning new languages, including dominant languages, should not
occur in subtractive bilingual environments, which do not value children’s
bilingualism/multilingualism, or its maintenance. The rationalisations based on the
stigmatisation and glorification, the promises of benefits connected with leaving one’s
language and culture behind, which at the same time lead to the killing of the
dominated languages and cultures, are false. Subtractive formal education, which
Teaches children (something of) a dominant language, but almost always at the cost of
their mother tongue or first language, is genocidal. Skutnabb-Kangas & Dunbar
(2010) is a thorough legal, educational, sociological, sociolinguistic and economic
discussion of ITM education as genocide and crime against humanity.

The International Convention for the Prevention and Punishment of the Crime of
Genocide (E 793, 1948) has five definitions of genocide in its Article II. Two of them
fit subtractive ITM education today:

II(e), ‘forcibly transferring children of the group to another group’; and

II(b), ‘causing serious bodily or mental harm to members of the group’;

(emphasis added).

Assimilationist submersion education where ITM children are forced to accept
teaching through the medium of dominant languages, can cause serious mental harm
and often leads to the students using the dominant language with their own children
later on, i.e. over a generation or two the children are linguistically, and often in other
ways too, forcibly transferred to a dominant group. This happens to millions of
speakers of endangered languages all over the world (Harrison, 2007; Skutnabb-
Kangas, 2000). If there are no schools or classes teaching the children through the
medium of the threatened ITM languages, the transfer to the majority language
speaking group is not voluntary. Meaningful alternatives do not exist, and parents do
not have enough reliable information about the long-term consequences of the various
choices they are forced, by circumstance, to make. Because of this, disappearance of
languages cannot be labelled ‘language death’, or ‘language suicide’, even if it might
at first seem that the speakers are themselves ‘voluntarily’ abandoning their
languages.

An allied but equally false educational philosophy claims that minority children
learn the dominant language best if they have most of their education through the
medium of the dominant language. Many studies have demonstrated, however,

exactly the opposite. If children are taught an additional language in an additive
bilingual context, which recognizes the value of bilingualism and its ongoing
maintenance, and uses the students’ bi/multilingual linguistic repertoire as a basis
for learning, they are more likely to achieve academically (Baker, 2011; García, 2009;
May & Dam, 2014). Moreover, the longer the mother tongue/first language remains
the main medium of education, the better ITM children learn the dominant language
and other subjects, while also of course, maintaining and developing further the languages they already know (see, e.g., Thomas & Collier 2002; McCarty, 2005; Tollefson & Tsui, 2003, Skutnabb-Kangas et al. eds, 2009). Thus, linguistic genocide, especially in education is the most important direct cause for the killing of the world’s linguistic diversity. Behind it we find many of the same global political, economic and techno-military causes that are also responsible for the killing of biodiversity. We could summarise the three main reasons for the disappearance of biodiversity as follows- the poor and powerless economic and political situation of people living in the world's most diverse ecoregions;

- habitat destruction through logging, spread of agriculture, use of pesticides and fertilisers, deforestation, desertification, overfishing, etc..

- knowledge about how to maintain biodiversity and use nature sustainably disappears with disappearing languages; much of this knowledge is encoded in the small languages of ITMs and other local peoples. See references to Harmon, Maffi and Skutnabb-Kangas, with colleagues, for the causal relationship; see also Posey, 1999; Maffi & Woodley 2010)

The striking correlations between the geographic distributions of species and languages, mentioned above, are a spatial representation of the parallels between the biological and linguistic diversity. There are many other ways in which they are comparable, however. Both are fundamentally evolutionary, with all living species and languages the result of descent with modification from, respectively, a common genetic or linguistic ancestor. The histories of species and languages are traced by similar taxonomic methods and result in similar phylogenetic trees that reflect an evolutionary branching process. Both kinds of diversity can be classified hierarchically, with the genes/species/ecosystem ladder of biodiversity matched by structural/language/lineage levels of linguistic diversity. The quality of being restricted to or deeply associated with a particular place or region is of special interest in both, so that endemispecies and Indigenous languages are considered to be especially important. The main driver of both speciation and language genesis is isolation (reproductive for species, communicative for languages), but on each side there are other ways new discrete forms can arise (see Harmon 2002 for a discussion). The same biogeographic factors that give rise to species diversification are probably at least partly behind language diversification. Finally, as noted above the extinction of biological and linguistic diversity shares the same root cause: neoliberal globalization.

There are important differences between the two kinds of diversity, however. First and foremost is that linguistic diversity is volitional: the existence of languages depends on the behavioral choices of individual people, whereas a member of a nonhuman species cannot choose to abandon (or add to) its species identity. In other words, languages, but not species, are additive: one can be a speaker (even a native speaker) of more than one language, but one cannot be a member of more than one species. Relatedly, while the classic (though simplistic) way to decide whether two individual organisms are members of different species is to determine whether they can potentially interbreed, there is no such interchange barrier imposed in the linguistic realm: any human being is, in theory, capable of learning any language. In

2 The most grim examples come from intentional destruction through chemical warfare, e.g. in Vietnam from 1966: ‘The use of defoliants, herbicides, toxic gases transformed parts of the countryside into a lunar landscape. Whole areas became uncultivable and remain so to this day.’ (Ali 2003, 293)
addition, human languages are shaped by a host of sociocultural factors that are far more intricate, and at the same time more wide-ranging, than any that obtain in even the most complex societies of nonhuman social species.

FUTURE DIRECTIONS
The future of both linguistic diversity and biodiversity will be determined by how the world’s people behave over the next few decades. If one or more of the major factors affecting the continued viability of the biosphere—population growth, overconsumption of resources, waste production, habitat destruction, and climate change—continue unabated, then prospects for avoiding the first-ever human-caused mass extinction of species are dim indeed. Of these factors, climate change is the overarching, and so one might summarize the threats by saying that the future of biodiversity depends on how severe the impacts of climate change turn out to be. If formal education and mass media continue to kill languages and falsely legitimate this, instead of implementing linguistic human rights, also in education, then we minimise the chances of human success and adaptability that linguistic and cultural diversity maximise (see Phillipson & Skutnabb-Kangas, this volume).

Why is biocultural diversity disappearing, through linguicide and ecocide? The ultimate reason is neoliberal globalization. We now live in a world where the dominant economic and political forces are aligned to encourage untenable economic growth that seems to require uniformity, homogeneity and the seamless global interchange of products and information. Government policies (supported by the private sector) generally favor developing resources for human use, which simplifies the landscape as it destroys wild animal and plant habitat. Similar policies promote linguistic unification either directly, through sanctions on Indigenous and minority language use, or indirectly, such as by concentrating economic opportunities in cities, thereby making it more difficult for the rural areas in which most languages evolved to remain viable places for the next generation of speakers. It is a question of both structural and ideological means of intentionally destroying human and natural resources, of committing equally heinous crimes against both humanity and nature, despite us in both cases having more than enough knowledge to counteract them.

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Further reading:
