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Environmental Education and Indigenous Knowledge in New Caledonian Geography Textbooks

Umweltbildung und Indigenes Wissen in Neukaledonischen Geographieschulbüchern

Educación ambiental y conocimiento indígena en los libros de texto de Geografía de Nueva Caledonia

Angélique Stastny, Matthias Kowasch

Zusammenfassung Dieser Artikel untersucht, wie Indigenes Ökologisches Wissen (IEK) und nachhaltige Entwicklung in neukaledonischen Geographieschulbüchern und Lehrplänen dargestellt werden. Unsere Fallstudie zeigt, dass staatlich gelenkte Umwelt- und Nachhaltigkeitsbildung oft mit impliziten neoliberalen Werten und dem Paradigma des Wirtschaftswachstums verbunden ist, und Wissen und kulturelle Praktiken der indigenen Kanak marginalisiert werden. IEK besitzt eine starke Verwurzelung in Land, Meer und der Ressourcen-Governance. Es ist daher notwendig, das ökologische Wissen der Kanak über die derzeitigen institutionellen Grenzen hinaus zu denken. Wir sind der Meinung, dass sozio-kulturelle Prinzipien, Werte und ökologisches Wissen der Kanak-Kulturen einen angemessenen Platz in der Schulbildung finden sollten.

Schlüsselwörter Indigenes Umweltwissen, Kanak-Kulturen, Geographieunterricht, Schulbücher

Abstract This article explores the ways in which Indigenous Ecological Knowledge (IEK) and sustainable development are represented in New Caledonian Geography textbooks and curricula. Our case study shows that state-driven Environmental and Sustainability Education is often linked to implicit neoliberal values and the paradigm of economic growth, and marginalizes Kanak Indigenous knowledge and practices. IEK is rooted in land, sea, and resource governance. It is therefore necessary to think Kanak knowledge beyond current institutional boundaries. We believe that customary principles, values, and ecological knowledge of Kanak cultures should find a rightful place in formal education.

Keywords Indigenous environmental knowledge, Kanak cultures, Geography teaching, textbooks

Resumen Este artículo explora las formas en que el Conocimiento Ecológico Indígena (IEK) y el desarrollo sostenible están representados en los libros de texto y planes de estudio de Geografía de Nueva Caledonia. Nuestro estudio de caso muestra que la Educación Ambiental y de Sostenibilidad (ESE) impulsada por el estado a menudo está vinculada a valores neoliberales implícitos y al paradigma del crecimiento económico, y margina el conocimiento y las prácticas indígenas canacas. IEK tiene sus raíces en la gobernanza de la tierra, el mar y los recursos. Por lo tanto, es necesario pensar el conocimiento canaco más allá de los límites institucionales actuales. Creemos que los principios consuetudinarios, los valores y el conocimiento ecológico de las culturas canacas deberían encontrar un lugar legítimo en la educación formal.

Palabras clave Conocimiento ambiental indígena, culturas canacas, enseñanza de la Geografía, libros de texto

1. Introduction

The islands of the South Pacific occupy a central place in the discussion on global environmental and climate change impacts, because they are particularly exposed to sea level rise and natural hazards, such as floods and cyclones. The archipelago of Kanaky-New Caledonia[1]–a biodiversity hotspot (Pouteau & Birnbaum 2016; Conservation International 2022) and home of the world's second largest coral reef–has to come to grips with high CO_2 emissions per capita, water pollution and soil erosion from its extensive nickel mining industry, as well as changing patterns in food supply that threaten the livelihood of local communities. Prevention of environmental degradation and adaptation to climate change are informed and supported by international protective measures, territorial and state legislation concerning sustainable development, but first and foremost by local and Indigenous ecological knowledge and practices.

Most studies published in academic journals in the field of Environmental and Sustainability Education (ESE) explore ESE in formal settings and rarely address Indigenous knowledge and practices (e.g., Kopnina 2013). Students mostly learn nature facts that distance them from emotional connections with nature while these very connections are nurtured in Indigenous societies (Anderson 2012). Yet, sustainability and the preservation of natural resources for future generations depend on both human and more-than-human well-being (Kronlid & Öhman 2013). Indigenous worldviews have their own powerful ways to develop social resilience to global changes impacting their lands and to adapt to dynamic ecosystems in ways that avoid preventable harms (Whyte 2018). Indigenous worldviews tear down the classical dichotomy between nature and culture, the material and the spiritual, and integrate human beings with other life forms (Knudtson & Suzuki 1992).

This article explores the ways in which Indigenous ecological knowledge (IEK) and sustainable development are presented in New Caledonian Geography textbooks. Whether and how young people learn about environmental concerns in the school system and how I(E)K is integrated into educational practices is closely connected to, and determined by a key political agenda: the gradual transfer of political powers over education from France to the territory since the 1998 Nouméa Accord. School curricula have been adapted to the local context and teaching materials have been produced for use in New Caledonian schools. State-driven ESE is often linked to implicit neoliberal values and the paradigm of economic growth. We therefore analyze the extent to which learners are encouraged to think about alternative and inclusive forms of environmental knowledge resulting in a "total worldview education" (Kopnina 2020, p. 286), including diverse educational structures, content, and paradigms.

This research is the first of its kind to raise these questions in the New Caledonian context. It provides valuable insights into some key priorities for further policy and development of teaching materials. After a review of the literature on ESE and on the integration of I(E)K in schooling, we will examine the Geography textbook sample in Kanaky-New Caledonia and the curriculum policies that shaped them. Finally, we will discuss some of the key priorities for further policy and teaching material development to support IEK in school education in the conutry.

2. Environmental Education and Indigenous Knowledge

The transgression of planetary boundaries (Steffen et al. 2015)–that define the limits of humanity's impact on Earth–increasing natural hazards as well as environmental damage have led to international discussions and regulations concerning environmental governance. Aikens et al. (2017, p. 334) argue that "[…] environmental degradation and international policy contexts were frequently described as drivers of sustainability uptake in education

policy". As a result, ESE has become a guiding principle in education policies, promoted by the United Nations through diverse programs. The Decade of Education for Sustainable Development (2005-14) was followed by the UN Global Action Program (GAP) on Education for Sustainable Development (2014-19). The new global framework on ESD (Education for Sustainable Development), the *ESD for 2030* program, aims to build "[…] a more just and sustainable world through strengthening ESD and contributing to the achievement of the 17 Sustainable Development Goals" (UNESCO 2019). The 17 goals, subdivided into 169 specific targets, recognize "[…] that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth–all while tackling climate change and working to preserve our oceans and forests" (UN 2020). The SDGs are to inspire Environmental Education (EE) and Education for Sustainable Development (ESD) and can encourage students to deal with accelerating change, increasing complexity, contested knowledge claims, and inevitable uncertainty (Lotz-Sisitka et al. 2015).

Both ESD and EE presupposes that learners should acquire knowledge and skills that are needed to promote sustainable development. Yet, sustainable development is in itself a concept subject to debate. The SDGs conflate, for instance, ecological sustainability with support of economic growth and neoliberal economy (Kopnina & Cherniak 2016; Washington 2018). McKenzie (2012, p. 71) points out that it is not access to quality education for all (SDG 4) that should be criticized, but "[…] rather the assumptions of what it should entail, and that it should necessarily be institutionalized, print-based, individualistic, and otherwise promoting western and neoliberal values".

The UN agendas on sustainable development gave an excuse to sideline environmental protection by its focus on *development* issues with only token attention to ecological sustainability (Kopnina 2020). Several authors (e.g., Kallis & Bliss 2019; Gómez-Baggethun 2020) highlight that the economic growth paradigm is the reason for environmental destruction and climate crisis. Concepts such as the *green economy* (Sullivan 2017), the *blue economy* (Pauli 2010) and *post-environmentalism* (Kallis & Bliss 2019) defend an ecological modernization of societies, but share a pro-growth agenda. Alternative approaches to sustainability such as degrowth (Washington & Kopnina 2018), economy for the common good (Felber 2012), Gross National Happiness (Verma 2017), and Indigenous knowledge are not taken into account in either those concepts or the existing UN agendas. Therefore, whether Education for Sustainable Development Goals (ESDG) is desirable in the first place should be questioned.

Compulsory schooling is a relatively recent phenomenon. Historically, in Kanaky-New Caledonia–alike other settler colonial societies–the colonial/dominant school system has attempted to eradicate Indigenous knowledge transmission and has served to oppress and assimilate Kanak communities, resulting in traumatic experiences (Bourdieu & Passeron 1970; Wadrawane 2020). Besides, Kanak knowledge continues to be seen as *myths* and *naïve beliefs* (Wadrawane 2017). This echoes Black's (2017, p. 453) observations in the international context, that "[…] Indigenous knowledge is generally given at best a secondary epistemological status within the school system, often viewed as superstition or mythology, as something which may have value as part of students' cultural heritage, but not as "real" knowledge that will frame their understanding of reality." When IK content is included in classroom teaching and learning, it is, according to Bishop (2020, p. 1; see also Blair, 2015), sometimes done in meaningful and enriching ways, but "[…] often in tokenistic and problematic ways". Likewise, Tyson Yunkaporta (2019, p. 19) observes that "[…] we rarely see global sustainability issues addressed using Indigenous perspectives and thought processes. […] Any discussion of Indigenous Knowledge systems is always a polite acknowledgement of connection to the land rather than true engagement. It is always about the what, and never about the how".

Given that Kanaky-New Caledonia is officially in an ongoing process of decolonization, and that 41 per cent of its inhabitants identify as Indigenous Kanak (census 2019; ISEE 2020), the issue of the place of Kanak (ecological) knowledge in the current school system is of great relevance and importance.

3. Kanaky-New Caledonia's Recent Educational Policies and the Textbook Sample

3.1 Curriculum Policies

The history of Kanaky-New Caledonia has been marked by settler colonialism, starting in the mid-19th century. Like in other settler colonial societies of the Pacific and elsewhere, the country has engaged in a process of reconciliation from the late 1980s. In a context of continuing Kanak struggles for self-determination and sovereignty, the reconciliation process has aimed at integrating Kanak people further by closing the [social-economic] gap with the rest of the population, opening up settler colonial institutions and social-economic spheres to Kanak people, and taking into account their cultural heritage and languages.

Following the Matignon-Oudinot Accords (1988) that put an end to the armed conflict of the 1980s, educational institutions recognized the importance of adapting the school system to local realities. The law of November 8, 1988 set as a goal the adaptation of education "to the particularities of the territory" through the "adaptation of curricula" (JORF 1988, p. 14,088).

Gradually, Geography curricula were adapted at the primary and secondary levels of education. The 1998 Nouméa Accord and the organic law 99-209 of 19 March 1999 set up the transfer of educational responsibilities from France to the territory. Jurisdiction for primary schooling was transferred from mainland France to New Caledonian provinces in 2000. Pro-independence politician Charles Washetine was in charge of the education and research portfolio between 2004 and 2009 and finalized the preparation of the primary school curricula. The curricula were adopted by the Congress in 2005 and put into practice in 2006. The following year, a local primary school Geography textbook was published (Jacquier et al. 2007).

In high school, curricula were adapted for year 10 in 1996, for year 11 in 2004, and for year 12 in 2008. A high school Geography and History textbook adapted to the local context was subsequently published in 2010 (Debien-Vanmaï & Lextreyt 2010). The transfer of jurisdiction over secondary schooling partially followed in 2012. Mainland France, however, has maintained authority over staffing, examinations, and national curricula for secondary school education. Kanaky-New Caledonia adapts the national curriculum, which is then approved by an institution in mainland France, the General Management of School Education *(Direction générale de l'enseignement scolaire)*.

3.2 Textbook Sample and Methods

The concept of ESD has a cross-curricular dimension, even if knowledge, values, and behavior related to sustainability is often taught within the discipline of Geography. The strong ties underlined by statements such as "geography could claim ESD (as its own)" (McKeown & Hopkins 2007, p. 18) explain our choice to focus on Geography textbooks to analyze the place of ESE and of I(E)K in schooling.

Because this research aims to be policy-oriented rather than historical, we have only selected recent textbooks that post-date the 1998 Nouméa Accord, that have been produced in Kanaky-New Caledonia for use in public schools and adapted to the official programs. Our textbook sample therefore consists of the only two Geography textbooks that have been published since 1998, one for primary school (years 4–6; Jacquier et al. 2007) and one for high school (years 11–12; Debien-Vanmaï & Lextreyt 2010).

A striking feature of the production of textbooks in Kanaky-New Caledonia is indeed that textbooks are few and far between. This issue is one of the key priorities further discussed in Section 5 of this article. Whereas New Caledonian textbooks have not been updated in more than a decade, the Geography curricula of both primary and secondary schools have continued to evolve since the publication of these textbooks. New school curricula were for instance introduced in New Caledonian primary schools in 2012 and 2019. Likewise, new secondary school curricula were implemented in 2013 and 2020. However, these two textbooks remain to date the latest ones adapted to the New Caledonian context that are available to teachers and students. For this reason, it remains relevant and worthwhile to conduct an analysis and a critique of their con-

tent for policy and teaching material development.

We have undertaken a mixed-method of qualitative and quantitative analysis of textbook content. The quantitative analysis enables the identification of trends in the narrative on environmental knowledge, and counted the introduction of each new theme as one mention so as not to discriminate between authors' writing styles. For example, when in one paragraph the author discussed *sustainable development*, regardless of whether they used the term once or more, we counted it as one mention as long as it referred to the same case/example/context. Both the body of the text and the visual sources have been scrutinized. We analyzed the proportion of environmental knowledge to the overall narrative, the terminology used, and the presence/absence of IEK and perspectives. For visual sources, the focus was on the activities and milieus represented in the illustrations.

Mayring's (2015) technique of structuration, which is an inductive establishment of categories, served to analyze the sample. The following seven categories were established to scope the content on environmental knowledge in breadth and depth: food and water systems; energy resources; mineral resources and mining; textile and heavy industries; transport; architecture and infrastructures; tourism and leisure. The empirical results from the study helped us identify and discuss key priorities for further policy and teaching material development in Kanaky-New Caledonia.

4. Sustainability, Environmental and IK in Textbooks

4.1 A Narrative Driven by Neoliberal Economic Development

Textbook authors are required to follow curricular guidelines. Thus, curricular content gives some hints about the policies that have framed the production of these textbooks. The 2007 primary school textbook was created as a teaching tool for the 2005 curriculum. The content of the 2010 textbook was tailored to the 2007 high school curriculum. The key learning areas of the 2005 primary school curriculum are:

> (1) to help the students understand key geographical and landscape patterns in their local area and around the world;
> (2) to analyze and compare how human beings live on Earth; and
> (3) the "assets and stakes of economic development in New Caledonia, France, and the world" (JONC 2005, p. 6,388).

Content on ecological issues in the 2005 primary school curriculum is limited to a bullet point on the preservation of natural resources and milieus in Kanaky-New Caledonia. In high school, the year 10 curriculum includes a cross-curricular theme on the environment: the relation of human beings with their environment, risk of natural disasters, climate change and its impacts, and land development policy. The 2007 curricula for year 11 and year 12 do not explicitly refer to ecological knowledge or environmental protection, but focus on economic development, the key economic powers in the world and social-economic disparities between the global *North* and the global *South*.

Accordingly, the narrative in the selected textbooks focuses mainly on industrial and economic development. Units include content on mass tourism (such as cruises, large resorts and luxury hotels), large-scale heavy and extractive industries, and extensive agriculture. In the 2007 Geography textbook, the economic power of heavy industries (i.e., aeronautic, car manufacturers) is praised (Jacquier et al. 2007, p. 98). There is no focus on neither the ecological impact of such industrialization nor the potential sustainable practices and measures taken in the industry. Industrialization is encouraged for the financial profit and power it brings to the countries. European countries are predominantly described in superlative terms. The textbook authors declare that Western and Northern Europe are "the richest and most industrialized regions of the continent" (Jacquier et al. 2007, p. 138). Among these countries, France is presented as one of the greatest industrial powers. The neighboring larger Pacific countries of Australia and New Zealand are characterized as great trading countries: Australia exports min-

erals (coal, uranium, etc.), sugarcane, wine, and wheat, New Zealand lamb and mutton.

The authors also disseminate a pro-mining discourse, that put to the fore important extractive industries and mining nations in the region, such as Australia and New Zealand. Financial compensation to local communities affected by the mining impacts are not mentioned; neither sustainability practices put in place in the mining sector to curtail the pollution and environmental destruction they cause. The focus is on the creation of jobs and financial benefits: "[…] currently, more than 1,700 people work in mining and more than 1,300 in the metal processing industry. Mining and metal products make up more than 80% of export value of New Caledonia" (Jacquier et al. 2007, p. 117).

In the units on agriculture in Europe, large-scale, mechanized and single-crop farming is presented as advanced and *very efficient*:

> In most parts of Europe, modern and mechanized agriculture is dominant. It uses machines, fertilizers, pesticides and irrigation systems, and selects species. The agricultural landscapes have been transformed. […] Farmers select the most productive races and use computer-run machines to feed the animals, milk the cows […]. These techniques enable to improve the agricultural outputs, which keep increasing (Jacquier et al. 2007, p. 96) (see Fig. 6)

In fact, when small-scale, subsistence agriculture is discussed, it is presented as archaic, difficult, and hardly sufficient to survive on:

> In some areas, especially in Central and Southern Europe, traditional agriculture remains. Peasants have few equipment. They still use rudimentary means: carts are pulled by horses or oxen, hay is harvested manually […] Working the land is difficult and is hard for agriculturalists to live off. All these regions are becoming modern little by little (Jacquier et al. 2007, p. 96)

The benefit of large-scale, mechanized, single-crop farming has, since then, been challenged by scientific reports. A 2013 United Nations report on *Smallholders, Food Security, and the Environment* (IFAD 2013) testified that not only mixed-crop farming ensures greater food security and reduces poverty but small-scale farming depends on well-functioning ecosystems and therefore needs to be maintained. Such findings find an echo in the New Caledonian context where Kanak agricultural and horticultural practices remain vital and common. Recent research of Bouard et al. (2020) confirms the economic importance of farming and hunting/fishing activities for communities. Based on a large empirical study, the authors highlight that for each household, the income from subsistence activities represents 120 € on average from a total income of 2,045 € per month. Nevertheless, alternative forms of development and subsistence economies are not duly and genuinely taken into consideration and remain marginal in the textbooks examined.

4.2 The Marginal Place of Sustainable Development and the Exclusion of Kanak Knowledge

Compared to industrial, large-scale and intensive practices, sustainable or small-scale economic practices are less mentioned in textbooks. In the 2007 textbook, activities and industries with a highly destructive impact on ecosystems are, by large, more represented than the alternatives (Fig. 1 and Fig. 2). The latter are not included at all in the content on *mineral resources and mining* and *textile and heavy industries*. Exceptions are content on *food and water systems* and *tourism and leisure* that present in equally-proportionate ways industrial, large-scale, resource-intensive practices and practices more respectful of the environment (labelled as *ecological*). The *energy resources* category includes slightly more content on renewable than non-renewable energy.

Activities that have been categorized as more *ecological* and less harmful for the environment in each of these sectors include:

- *Food and water systems:* small-scale cultivation, sustenance agriculture, hunting and fishing, organic or chemical-free farming, small-scale family-run productions (such as beekeeping, the sale of home-made food produce from kitchen gardens, etc.).
- *Energy resources:* energy not directly created from minerals from the extractive industry, such as solar and wind power, and hydroelectricity.
- *Mineral resources and mining:* initiatives put in place to mitigate the impacts of extractive industries on the environment, projects for ecosystem restoration, revegetation and healing the land.
- *Textile and heavy industries:* industries and initiatives to reduce the reliance on water-intensive crops (cotton), to encour-

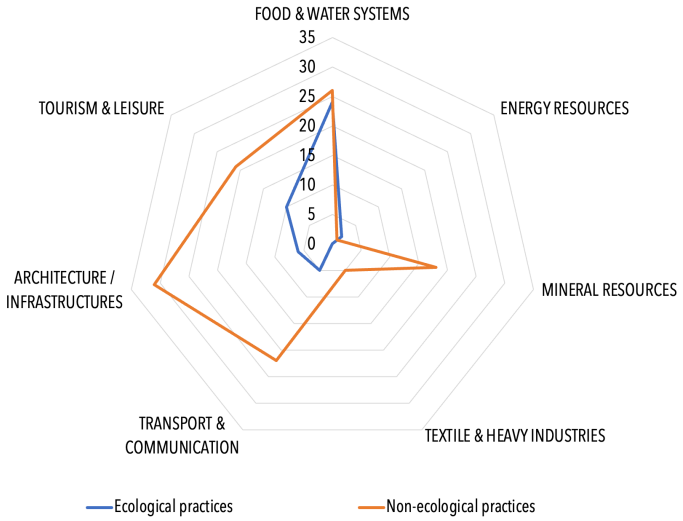


Fig. 1. Number of mentions of *more ecological* and *non-ecological* practices in the 2007 textbook (Source: authors)

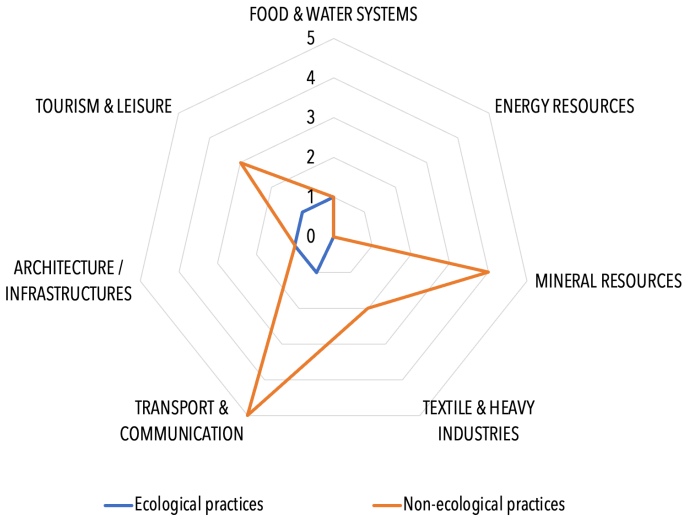


Fig. 2. Number of mentions of *more ecological* and *non-ecological* practices in the 2010 textbook (Source: authors)

age recycling and upcycling, to reduce the transportation distances between manufacturer and retail.

- *Transport:* public transport, car-pooling, pushbikes, and urban planning that encourages the use of such means of transport and that through designs e.g., pedestrian areas and Park&Ride systems.
- *Architecture and infrastructures:* use of natural, locally-sourced materials, carbon-neutral and energy-efficient designs, impacting as little as possible local ecosystems (e.g., wildlife corridors).
- *Tourism and leisure:* facilities and activities with reduced reliance on construction, resources, or large facilities (e.g., community stay, hiking, ecotourism).

Industrial, large-scale, and ecologically-destructive practices are also generally prevalent in the visual sources of textbooks. In the 2007 Geography textbook, ecological practices are represented between two and eighteen times fewer, across the categories, except for content on *energy resources* and *food and water systems* that provides a roughly similar coverage of industrial, resource-intensive practices and more ecologically-conscious practices. The same result applies to the 2010 high school textbook, except for the content on *food and water systems* and *architecture and infrastructures*.

Of the practices that can be considered *ecological*, several of them are set in Indigenous milieus, and more specifically in Kanak community contexts (Fig.3 and Fig. 4). This is especially the case for the 2007 textbook, in *food and water systems* (13 out of 21 mentions), *tourism & leisure* (5 out of 10 mentions), and *architecture* (all 4 mentions), in which Kanak subsistence agriculture, ecotourism

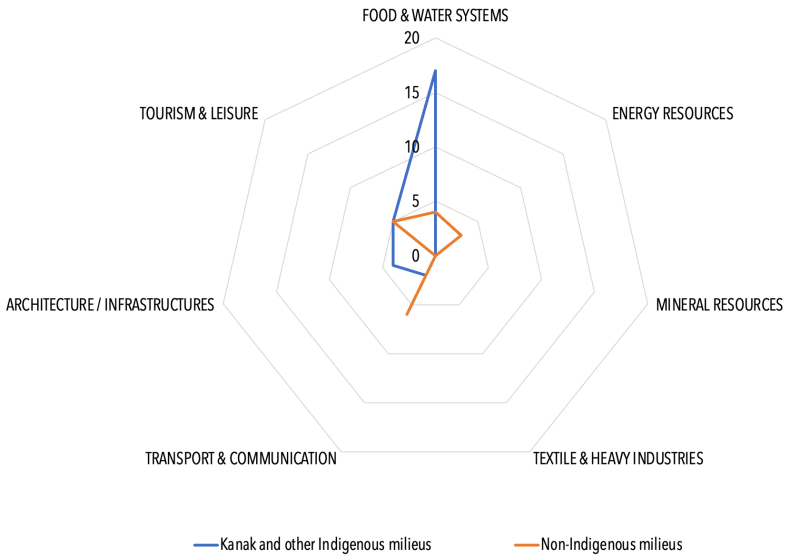


Fig. 3. Number of *ecological* practices set in Indigenous and non-Indigenous milieus in the 2007 textbook (Source: authors)

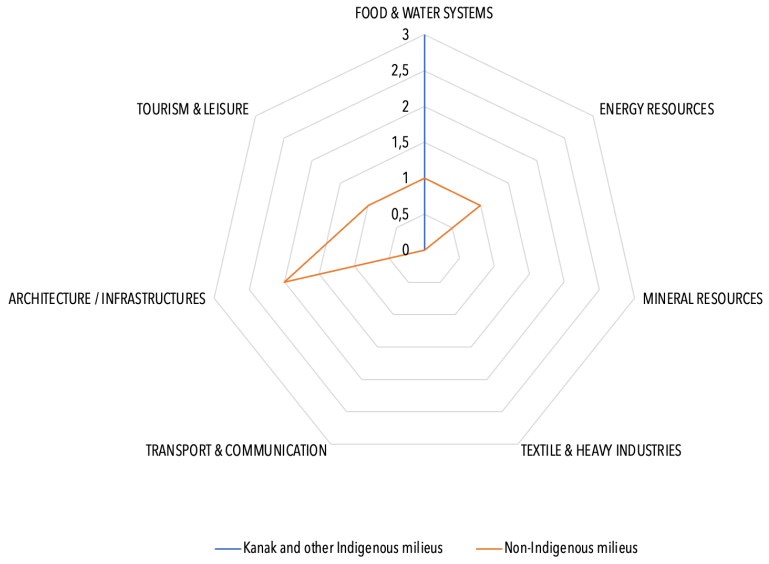


Fig. 4. Number of *ecological* practices set in Indigenous and non-Indigenous milieus in the 2010 textbook (Source: authors)

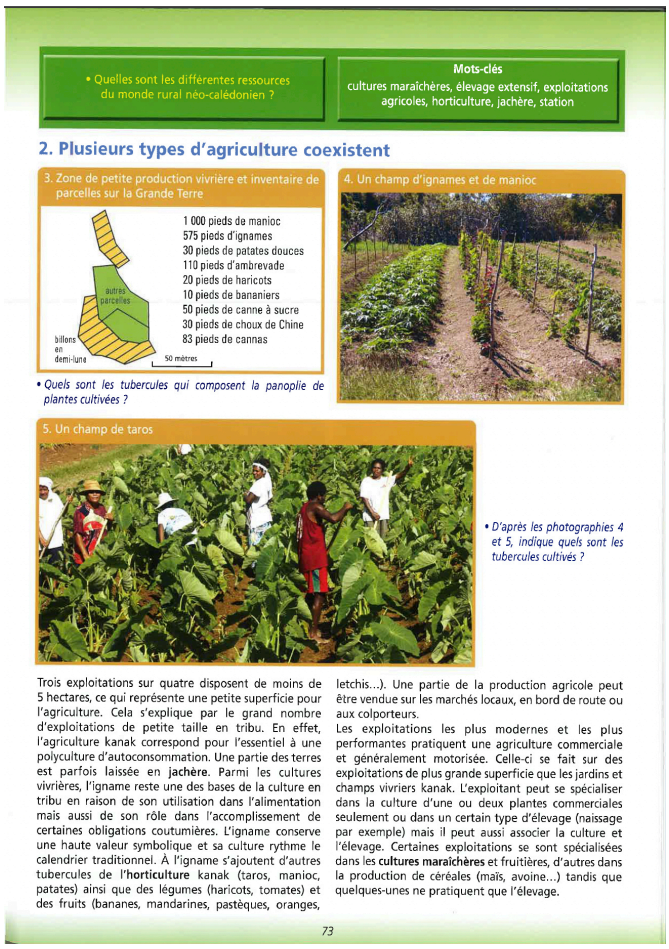
and Kanak ancestral architectural practices are presented. In the 2010 textbook, 3 of the 4 mentions in *food and water systems* deal with subsistence agriculture in Indigenous milieus.

However, the correlation between Indigenous practices and care for the Earth is not made in the textbooks examined. Agricultural practices are briefly mentioned as one of "mixed-crop farming for self-consumption" (Jacquier et al. 2007, p. 73) (see Fig. 5), and so are Kanak traditional canoes (Jacquier et al. 2007, p. 76) and the use of natural resources:

> The wood has multiple uses: to make furniture, roofs, handicraft or to cook food. Animals and plants are essential for our food, whether it be raw products, such as fruits, roots, animal flesh, or processed food. Natural elements allow as well to make other products, such as dyes and perfumes, and some indispensable products for medicines (Jacquier et al. 2007, p. 120).

There is no content on Kanak knowledge and governance of natural resources, or on the measures and behaviors Indigenous Kanak people have adopted to respond to ecological destruction and adapt to climate change. Kanak people are excluded in the reflexion on both the preemptive/prevention stage (how knowledge and practice might help in understanding best practice to protect biodiversity and ensure a thriving environment) and the response stage (actions undertaken to respond to already-occurring ecological destruction and threats to their territories). Textbooks focus instead on funds and measures put in place by governments and international organizations for sustainable development.

Notwithstanding the written and visual content that we have identified as depicting activities that are more respectful of the environment, mentions of projects and initiatives



• Quelles sont les différentes ressources du monde rural néo-calédonien ?

Mots-clés
cultures maraîchères, élevage extensif, exploitations agricoles, horticulture, jachère, station

2. Plusieurs types d'agriculture coexistent

3. Zone de petite production vivrière et inventaire de parcelles sur la Grande Terre

• *Quels sont les tubercules qui composent la panoplie de plantes cultivées ?*

4. Un champ d'ignames et de manioc

5. Un champ de taros

• *D'après les photographies 4 et 5, indique quels sont les tubercules cultivés ?*

Trois exploitations sur quatre disposent de moins de 5 hectares, ce qui représente une petite superficie pour l'agriculture. Cela s'explique par le grand nombre d'exploitations de petite taille en tribu. En effet, l'agriculture kanak correspond pour l'essentiel à une polyculture d'autoconsommation. Une partie des terres est parfois laissée en **jachère**. Parmi les cultures vivrières, l'igname reste une des bases de la culture en tribu en raison de son utilisation dans l'alimentation mais aussi de son rôle dans l'accomplissement de certaines obligations coutumières. L'igname conserve une haute valeur symbolique et sa culture rythme le calendrier traditionnel. À l'igname s'ajoutent d'autres tubercules de l'**horticulture** kanak (taros, manioc, patates) ainsi que des légumes (haricots, tomates) et des fruits (bananes, mandarines, pastèques, oranges, letchis…). Une partie de la production agricole peut être vendue sur les marchés locaux, en bord de route ou aux colporteurs.

Les exploitations les plus modernes et les plus performantes pratiquent une agriculture commerciale et généralement motorisée. Celle-ci se fait sur des exploitations de plus grande superficie que les jardins et champs vivriers kanak. L'exploitant peut se spécialiser dans la culture d'une ou deux plantes commerciales seulement ou dans un certain type d'élevage (naissage par exemple) mais il peut aussi associer la culture et l'élevage. Certaines exploitations se sont spécialisées dans les **cultures maraîchères** et fruitières, d'autres dans la production de céréales (maïs, avoine…) tandis que quelques-unes ne pratiquent que l'élevage.

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Fig. 5. Mixed-crop farming for self-consumption in the 2007 textbook (Source: JACQUIER ET AL. 2007, p. 73)

3. Une agriculture très performante

7. Une grande culture céréalière au Royaume-Uni

8. Le ramassage du foin en Roumanie

• *Décris les photographies 7 et 8.*
• *Quels sont les moyens qu'utilisent les agriculteurs dans chacun de ces deux pays ?*
• *Que peux-tu en déduire sur le niveau de vie de ces agriculteurs ?*

9. L'élevage de volailles en batterie

• *Décris la photographie 9.*
• *Comment les volailles sont-elles élevées ?*
• *Que penses-tu de ces élevages modernes ?*

10. Vergers irrigués et culture sous serres en Espagne

• *Que cultive-t-on dans les serres ?*
• *Quel est l'intérêt de la culture sous serres ?*

Dans la majeure partie de l'Europe, l'agriculture mécanisée et moderne domine. Elle emploie des machines, des engrais, des pesticides, des systèmes d'irrigation et pratique la sélection des espèces. Les paysages agricoles ont été transformés.

Les agriculteurs font des cultures **hors-sol** et de l'**élevage en batterie**. Les éleveurs sélectionnent les races les plus productives et emploient des machines programmées par ordinateur pour distribuer les aliments, traire les vaches… Ces techniques permettent d'améliorer les rendements agricoles qui sont de plus en plus importants. Les régions se sont spécialisées dans certaines activités agricoles : production de céréales ou élevage. D'immenses espaces sont cultivés en openfield ou couverts de **serres**.

Dans certaines régions, particulièrement en Europe centrale et en Europe du Sud, l'agriculture traditionnelle subsiste. Les paysans disposent de peu d'équipements. Ils utilisent encore des moyens rudimentaires : les charrues sont tirées par des chevaux ou des bœufs, le ramassage du foin se fait à la main… Le travail de la terre est pénible et permet à peine aux agriculteurs de vivre. Toutefois ces régions se modernisent également peu à peu.

L'agriculture européenne compte parmi les plus productives du monde.

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Fig. 6. Efficient mechanized agriculture in the 2007 textbook (Source: JACQUIER ET AL. 2007, p. 96)

that are explicitly focused on ecological practices or labelled as *sustainable* are scarce. The 2007 textbook includes seven isolated references in total: one on food and water systems (protected species, p. 81), three on energy resources (geothermal and hydroelectric plants in New Zealand, p. 92; the reasonable use of resources for sustainable development, p. 121; the exportation of solar water heaters, p. 127) and three on the leisure and tourism sectors (ecotourism, pp. 123, 152; and green tourism, p. 93). Moreover, the authors point at the production of waste and at the necessity of recycling (p. 19). Only two notions related to sustainable development are explained in the body of the text: *renewable resources* and *ecotourism*. The authors define sustainable development as

> […] bringing nature closer to humankind. It consists of respecting the natural environment and using resources reasonably among other things, so that they remain available for those who will come after us (the future generations). This implies preventing waste, controlling waste disposal, not spoiling nature and preserving the biodiversity (Jacquier et al. 2007, p. 121).

Of the seven mentions of *sustainability* or *sustainable development*, two are set in Indigenous Kanak milieus: namely, community stays as forms of ecotourism. In addition, there is a photograph of a solar-powered phone booth at the Borendi community (Jacquier et al. 2007, p. 70). The 2010 high school textbook makes only one mention of sustainable development: how sustainable energy in Samoa and a more sustainable approach to natural resources were enabled through investments from the European Union and the Lomé Agreement (Debien-Vanmaï & Lextreyt 2010, p. 111).

4.3 Individuals versus the State: Awareness of, and Responses to, Ecological Destruction and Climate Change

Textbook authors allocate only a marginal place to environmental protection and exclude Kanak ecological knowledge completely. They nonetheless acknowledge, to a certain extent, ecological destruction and raise awareness about climate change. In the 2007 textbook, there are seven mentions referring to the destruction of ecosystems, ecological awareness and efforts for conservation. Environmental impacts cover the topics of biodiversity loss, water pollution, overfishing, degradation of mangroves, deforestation, and pollution caused by landfills. In addition, there is one chapter on environmental protection in Kanaky-New Caledonia. Illustration of degradation and destruction is largely dominant, over proactive measures to slow and invert that trend, in the visual sources. Nine photos out of eleven depict environmental degradation while only two of them present initiatives for the protection of ecosystems. In the 2010 textbook, all written content that reflects ecological awareness focuses on degradation and destruction, and no visual sources raise ecological awareness.

The 2010 textbook includes a sub-section of a chapter to the fact that globalization can lead to environmental damages and impacts the organizing of Oceanic societies (Debien-Vanmaï & Lextreyt 2010). The content on ecosystem degradations and climate change consists of (1) a press article from Agence France Presse on the acid pollution in Prony Bay; (2) an extract from a press article on mining impacts in Nauru; and, (3) an excerpt from a report on the issue of climate refugees and the refusal by the Australian government to give asylum to people from Tuvalu (Debien-Vanmaï & Lextreyt 2010, p. 61, pp. 113–114).

Ecological knowledge and awareness about the degradation of ecosystems is limited to a few references and remains marginal and compartmentalized in the textbooks examined. The responsibility for ecological degradation is more readily put on individuals than the state. The authors of the 2007 textbook accuse New Caledonians of polluting the lagoon and coral reefs with boat anchors and engine oils, and discarding waste, especially plastic bags in the sea, on which turtles choke on (Jacquier et al. 2007, p. 119). The authors highlight however that "[…] some ecological problems are so serious that they reach the global level (air pollution) and surpass the power of a single government" (Debien-Vanmaï & Lextreyt 2010, p. 147).

While state policies are not portrayed as part of environmental problems, they are overrepresented in the responses and solutions put in place to face climate change and prevent ecological destruction. Jacquier et al. (2007, p. 29, p. 81) explain that land and sea animals such as the cagou, dugong, and turtles, are the subject of scientific studies and

monitored. State policies and provincial authorities in Kanaky-New Caledonia have taken measures against overfishing and have implemented marine protected areas. European countries reduced the number of fishing boats to avoid the extinction of marine species and conduct custom checks of people and goods to limit the spread of invasive species (Jacquier et al. p. 97, p. 119). Nation states are supported by international bodies in the protection of ecosystems. In contrast, grassroots actions and campaigns that regularly take place on the ground, at the local level, are not given any room in the textbooks examined. Neither are Kanak customary regulations and practices.

At the didactic level, the textbooks examined lack pedagogical activities that would encourage learners' agency and worldviews. The 2010 textbook for high schools has none, while the 2007 textbook for primary schools includes a few exercises, for example naming the closest protected areas to their homes and reflecting on their own behavior and ecological footprint. The prescriptive character of an expert-driven ESD approach is visible in both textbooks: "Never throw rubbish […] anywhere else but in the bins; do not hunt or fish native species; save electricity and water; when possible, walk or take public transport instead of driving" (Jacquier et al. 2007, p. 121). Several authors (e.g., Evans et al. 2017) have criticized such tendency to prescribe certain actions and practical instructions beyond ethical education. Referring to Standish (2009, p. 40), it does not help students to develop a "moral compass".

Action-oriented activities and exercises (such as role play, field-trips, web search, etc.), without prescriptive character, are missing entirely in both New Caledonian textbooks. Action-oriented learning is indeed most motivating for students and can enable the inclusion of affective components (Applis 2012). It stimulates inner curiosity, which can promote a change of behaviors and transformative learning experiences. The inclusion of action-oriented activities in Geography teaching on climate change and on ecological knowledge is a matter that therefore necessitates further teaching material development.

5. Key Priorities for Further Policy Teaching Material Development

5.1 A Dire Need for More Regular Publication of Geography Textbooks

As we pointed out in the first part of this article, textbooks are few and far between in Kanaky-New Caledonia. Besides, there is no local textbook specifically tailored for lower secondary school (years 6–9), and for year 10 in high school. This brings up two major issues: (1) textbooks are no longer adapted to current curricula, and are therefore less relevant and utilizable; and (2) considering that their content has not been updated, textbooks do not keep up with the evolution of societal concerns and debates on environmental issues, the place and role of Indigenous people and worldviews, and the decolonization of education in settler colonial societies, such as Kanaky-New Caledonia.

Sustainable development became a more distinctive theme in the 2012 curricula, implemented in 2013, and a greater emphasis was put on sustainability in 2019 and 2020. The 2012 curriculum for year 7 introduced the concepts of renewable resources and climate change, while *Societies and sustainable development* was a guiding theme of the year 10 curriculum. The 2020 year 6–9 curriculum addresses biodiversity and deforestation. The 2019 primary school curriculum is the most ambitious in terms of environmental knowledge, with content on sustainable development, biodiversity, soft mobilities, recycling and eco-districts. In year 4, one theme (out of three) includes a focus on the responsible consumption of goods and resources and sustainable development. In year 5, two themes (out of three) deal with sustainable development. The 2019 curriculum states that Geography also encourages students to understand the "imperative need of a sustainable development of human habitat on Earth" (JONC 2019, p. 872).

The Geography textbooks, which are currently available, do not cover the new content. They therefore no longer are a practicable teaching tool to teach curriculum content that has evolved to include themes dedicated to environmental knowledge and sustainability.

Such limitation calls for the need to produce New Caledonian textbooks more regularly and for all year levels.

5.2 Recentering Ecological Knowledge in Curricular Content

Efforts to produce new teaching materials need to be preceded by the reframing of Geography curricula content. While curricula dedicate more substantial content to environmental knowledge in primary school and in the early years of middle-school, the urgency of the ecological crisis may, in some cases, be belittled or ignored. In addition, as students reach upper-level years, the reflection on environmental protection becomes scant. The 2020 broad curriculum guidelines for years 8–10 mention that it is important to raise awareness among the students about the question of development, which is linked to global changes and the overuse of natural resources. Nevertheless, ecological knowledge is hardly covered in years 8 and 9–which is sanctioned by an end-of-year examination–, except for a brief comment on the necessity of protecting fragile marine ecosystems in the year 8 curriculum. In year 10, one theme *(Societies and environments: fragile balances)* out of four focuses entirely on the issue of ecosystems and the management of resources. However, in years 11 and 12–which are considered the most important years of high school as they are sanctioned by a national examination–environmental knowledge disappears almost completely from the curricula. In these years, the Geography curriculum content focuses on development, globalization, and economic powers (i.e., EU, China, USA, Japan) mainly. The grand narrative of neoliberal economic development is sustained.

5.3 Shared Responsibility

According to the 2007 textbook, responsibility for ecological degradation is often conveyed on individuals rather than the state or private companies. There is an urgent need to share responsibility for environmental damage and for global and environmental changes. Textbooks–whose function is to transmit knowledge and shape the mind of young people–should provide a more comprehensive and holistic approach to ESE, including pluralistic views on issues of global changes and possible solutions for social-ecological transformations.

Shove (2010, p. 1274) argued that it is a "thought to lie with individuals" that their behavioral choices will make the difference in responding to climate change. In an article on consumption behavior, Evans et al. (2017) defend an emergent sense of shared responsibility, including consumers, producers, trade companies, supermarkets, and politicians. National curricula and textbooks should not accuse students alone to be responsible for environmental damage and for behavioral change towards sustainable consumption. As responsible citizen, students can contribute to social-ecological transformations, but they should learn about the different actors involved and the responsibility they can/should assume.

5.4 Recentering I(E)K

In 2016, a new educational reform has been voted by the New Caledonian Congress (Wadrawane 2020). The reform makes the teaching of Kanak culture and knowledge compulsory. Nevertheless, questions remain about the ways that this knowledge can be taught in schools. Despite the reform, curricula and textbooks in Kanaky-New Caledonia still fail to include Indigenous Kanak ecological knowledge and practices. Neither the 2019 primary school curriculum nor the secondary school curricula in use in 2020 include content on I(E)K. This settler-centered approach to ecological knowledge is reinforced by the fact that due to a lack of regular renewal of New Caledonian textbooks, teachers in Kanaky-New Caledonia have to rely predominantly on French textbooks designed for a French/European audience. Engaging solely with the expert-driven discourse of sustainability only allows for a partial–and often discriminatory–understanding of ecological knowledge. It defines and restricts who has the right to be involved in decisions about the use and the protection of resources and the ecosystem, and who is excluded (Rose 2014). The ways that ESD relates to IEK is therefore an important issue to address because it is part of power relations that continue to marginalize Indigenous people, and sustain a European/white/settler-centered monologue about the ways that human beings have inhabited, inhabit, and shall inhabit the Earth.

Should I(E)K be included in curricula and (Geography) textbooks and thus become compulsory for primary and secondary school students in Kanaky-New Caledonia, the application and transmission of such knowledge could remain problematic, as not all teachers have had meaningful interactions with Kanak culture and practices. In addition, Indigenous Kanak teachers remain under-represented in the teacher cohort, especially at high school level (years 10–12). Therefore, I(E)K should also be included in teacher education programs.

While the discourse of sustainable development has gained international currency and has become a universal paradigm encompassing common concerns, significant divergences in understanding, experiences, and practices exist between Indigenous and non-Indigenous peoples, and between Indigenous peoples, states, and international bodies (Throsby & Petetskaya 2016). Contemporary (largely non-Indigenous) proponents of the concept of sustainable development have often evolved apart from, and in parallel to, Indigenous discourses and actions. By referring to the Anishinaabe peoples (USA/Canada), Whyte (2018, p. 137) notes that they "advocate for the continuance and renewal of moral relationships of responsibility, spirituality, and justice", as leaders of environmental movements. Spirituality refers to moral relationships to human and more-than-human beings. In contrast to a neoliberal agenda of development, Indigenous ecological knowledge and worldviews are based on Indigenous rights recovery. IEK is thus rooted in land, sea, and resource governance. Engaging with Indigenous ecological knowledge is a commitment to a plurality of knowledge, worldviews, and agencies. It opens up a dialogue on environmental knowledge and education (Kohl & Hopkins 2019). Previous research (Hill at al. 2012) has shown that a dialogical approach inscribed in Indigenous governance can hold direct benefit for Indigenous peoples and positive environmental impacts for the society at large.

6. Conclusion

Content analyses of New Caledonian Geography textbooks have shown that in-depth environmental knowledge is marginal. While neoliberal economic development and globalization are woven through the textbooks, environmental knowledge is compartmentalized. Ecological destruction is positioned as a collateral damage that, nonetheless, needs addressing to ensure continued economic growth and prosperity. When subsistence and small-scale economies are represented, they are not portrayed as effective, contemporary means of living on Earth, but as technology-backward ways that need mutating towards further economic and industrial development.

The marginalization of Kanak and other Indigenous knowledge and practices are a sign of the continuing colonial features of Geography textbooks and curricula in Kanaky-New Caledonia. The results from this research demonstrate the need to rethink dominant discourses of development, globalization, and sustainability in New Caledonian Geography textbooks.

As suggested by Kanak researcher Eddie Wadrawane (2020), customary principles, values, and regulations of Kanak cultures could be translated into educational knowledge and find their rightful place in schooling.

Another limitation of the textbooks examined was their obsolescence and their ill-alignment with current curricula. Efforts are required from, and the responsibility of, education institutions to produce teaching materials more regularly and for all year levels. Nevertheless, the content analysis of selected textbooks has revealed the need to produce also teaching materials that are free from institutional constraints and that move away from the vantage point of the state and that provide alternative ways of EE and transformation. Indeed, state-sponsored materials-created by public institutions for the interests of the state-tend to give prominence to state policies and measures, and exclude grassroots actions and, more acutely, Kanak ecological knowledge and practices. It is therefore also necessary to think and act Kanak ecological knowledge and educational governance beyond the vantage point of the state and beyond current institutional and textual boundaries.

Endnote

[1] While New Caledonia is the only name officially recognized by the French Republic, most Indigenous Kanak people call their country *Kanaky*. The name of the territory is to be rediscussed and eventually modified according to the 1998 Nouméa Accord. One of the propositions is *Kanaky-New Caledonia*, which was already used in 2012 by former French Overseas Minister Victorin Lurel. We use the term *Kanaky-New Caledonia* in this article.

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