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Generativity is a Core Value of the ESJ: A Decade of Growth

Erik Erikson (1902-1994) was one of the great psychologists of the 20th century[1]. He explored the nature of personal human identity. Originally named Erik Homberger after his adoptive father, Dr. Theodore Homberger, he re-imagined his identity and re-named himself Erik Erikson (literally Erik son of Erik). Ironically, he rejected his adoptive father's wish to become a physician, never obtained a college degree, pursued independent studies under Anna Freud, and then taught at Harvard Medical School after emigrating from Germany to the United States. Erickson visualized human psychosocial development as eight successive life-cycle challenges. Each challenge was framed as a struggle between two outcomes, one desirable and one undesirable. The first two early development challenges were 'trust' versus 'mistrust' followed by 'autonomy' versus 'shame.' Importantly, he held that we face the challenge of **generativity** versus **stagnation in middle life**. This challenge concerns the desire to give back to society and leave a mark on the world. It is about the transition from acquiring and accumulating to providing and mentoring.

Founded in 2010, the European Scientific Journal is just reaching young adulthood. Nonetheless, **generativity** is one of our core values. As a Journal, we reject stagnation and continue to evolve to meet the needs of our contributors, our reviewers, and the academic community. We seek to innovate to meet the challenges of open-access academic publishing. For us,

[1] Hopkins, J. R. (1995). Erik Homburger Erikson (1902–1994). *American Psychologist*, 50(9), 796-797. doi:http://dx.doi.org/10.1037/0003-066X.50.9.796

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generativity has a special meaning. We acknowledge an obligation to give back to the academic community, which has supported us over the past decade and made our initial growth possible. As part of our commitment to generativity, we are re-doubling our efforts in several key areas. First, we are committed to keeping our article processing fees as low as possible to make the ESJ affordable to scholars from all countries. Second, we remain committed to fair and agile peer review and are making further changes to shorten the time between submission and publication of worthy contributions. Third, we are looking actively at ways to eliminate the article processing charges for scholars coming from low GDP countries through a system of subsidies. Fourth, we are examining ways to create and strengthen partnerships with various academic institutions that will mutually benefit those institutions and the ESJ. Finally, through our commitment to publishing excellence, we reaffirm our membership in an open-access academic publishing community that actively contributes to the vitality of scholarship worldwide.

Sincerely,

Daniel B. Hier, MD

European Scientific Journal (ESJ) Natural/Life/Medical Sciences

Editor in Chief

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Understanding Trademark Likelihood of Confusion: Unfair Competition in a Digital Era

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Abstract

The development of the digital economy have increased risks of unfair competition using inappropriate or obviously false advertising of trademarks through social media. This, however, has erased legal ambiguity regarding the assessment of comparators of the trademarks before confusion for establishing unfair competition through the social networks. The paper distributes comparative research on distinguishing “legal name" and "commercial name” of trademarks before confusion when used for advertising purposes. While legal name is less relevant for the consumer, the commercial name under which undertaking operates on the market is a crucial element for establishing unfair competition. Accordingly, the paper through analytical research focuses on examining the rule of necessity of the cumulative presence of three established comparators: visual, phonetic, and semantic. Also, confusion between trademarks through the prism of unfair competition legislation can arise even without the presence of all these elements. The article provides suggestions to redefine legislative connotations of legal name and commercial name in respective statutory acts. It also recommends amending the notion of misleading commercial practice in Directive 2005/29/EC as the presence of the likelihood of one of the comparator autonomously creates confusion with any products, trademarks, trade names or other distinguishing marks of a competitor. As for Directive 2006/114/EC, it should be determined that in cases of misleading and comparative advertising, confusion may arise due to the presence of the likelihood of one of the comparators solely.

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Keywords: Unfair competition, social networks, trademark, likelihood of confusion, misleading advertising

Introduction

For developing countries with freshly enacted legislation, the crucial concern in the debate is on how to adjust competition law and international practices to best fit the needs of their markets (Ezrachi & Stucke, 2018). Thus, the issue of the adequacy and appropriateness of the consumers' welfare standard is intertwined with existence of markets with large numbers of participants, fully rational economic agents, and lower levels of market concentration. Consequently, competition regime should be focused on preventive measures in a more holistic paradigm, entailing interdisciplinary approach of competition, intellectual property rights, and consumer protection legislation (Njako, 2024).

Since 2014, the Law of Georgia on Competition has entered into force, and its purpose is to protect free competition from unfair restrictions and to promote healthy competition in the market among economic agents. As a result of the reform carried out in 2020, the law was brought as close as possible to the standard in force in the European Union (Guide Document issued by Georgian National Competition Agency, 2022).

The public body authorized to protect the rights and legal interests of consumers related to misleading activities in relation to trademarks and other distinguishing marks is LEPL Georgian National Competition Agency (GNCA), which is guided by the laws of Georgia on the protection of consumer rights (Law of Georgia on Protection of Consumer rights, 2022) and competition (Law of Georgia on Competition, 2012).

Although the two laws mentioned above regulate different legal relationships, the Law of Georgia on Competition regulates several marks defined by the Law on Protection of Consumer Rights of Georgia. This is with the difference that the competition legislation protects the interests of consumers indirectly under the umbrella of protecting the interests of competing economic agents. Also, the consumer is the direct subject of protection with marks defined by the consumer protection legislation.

The Law of Georgia on Competition has categorized actions considered as unfair competition with respect to a competitor's trademark or other distinguishing mark, the implementation of which leads to misleading consumers. These are:

a) provision of information about goods by any means of communication (including, through improper, unfair, unreliable or clearly false advertising), which misleads consumers and encourages them to perform certain economic actions;

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b) undermining by an undertaking of a competitor's business reputation (by creating an incorrect impression regarding the undertaking, products, entrepreneurial or trade activities), its unreasonable criticism or discrediting;
c) misappropriation of a competitor's or a third person's form of goods, their packaging or appearance (Law of Georgia on Competition, 2012).

Methodology

A systematic literature research is done with a view of investigating the question regarding misleading activity of competing economic agent towards consumer. In addition, a literature review will be conducted to understand the concept of misleading activities regarding trademarks and other distinctive signs. It will also address the rules on protection trademarks against unfair commercial practices and misleading advertising in Georgia, European Union, and USA.

Moreover, a systematic legal research on primary and secondary law is conducted for the purpose of analyzing the most significant legislation that governs the unfair competition through the social network in relation to the trademarks before confusion. For this reason, systematic and analytical research was performed on laws of Georgia on competition, trademarks, advertisement and corresponding EU directives, as well as United States code on commerce and trade.

To understand if differences exist in implementation, interpretation and compliance of unfair competition and trademark protection international rules with GNCA practice, a comprehensive study of national and international case law must be conducted. Particularly, it aims to conduct a comparative analysis of the nature and purpose of prohibiting activities that mislead consumers in relation to trademarks and other distinctive signs. As a result, examining practices of GNCA, Supreme and Constitutional Courts of Georgia, CJEU and national courts of EU member states brings challenges of assessing comparators of the trademarks before confusion for bringing unfair competition to light.

Research Questions

As stated above, the purpose of the article is to investigate the practices of the Georgian National Competition Agency regarding the misleading activity towards consumer in relation to the competitor's trademark or other distinguishing signs. Therefore, the following research questions will focus on the challenges and consequences related to the prohibition of unfair commercial activities using social networks:

- Compliance of Georgian legislation on competition and trademark protection with international statutory acts and case law.

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- Examining Practice of GNCA regarding unfair competition through the social network in relation to the trademark.
- Examining conceptual difference between terms of “legal name" and "commercial name” of trademarks before confusion when using them for advertising purposes.
- Examining the rule of necessity of the cumulative presence of three established comparators (visual, phonetic and semantic) for determining confusion between trademarks through the prism of unfair competition legislation.

Overview of the Legislation in Force in Georgia Prohibiting Activities that Mislead Consumers in Relation to Trademarks and other Distinctive Signs

Under the Law on Competition, the unfair use of a competitor's trademark or other distinguishing mark is considered a misleading activity towards consumer using any means of communication, including unfair commercial activity carried out through a social network. This is within the scope of which the unfair use of a competitor's trademark significantly changes or is likely to change the average consumer’s economic behavior in relation to the goods or services provided or intended for him. The use by a manufacturer of another manufacturer's trademark for intentionally advertising similar goods or services as if those goods or services were produced by a competitor may also be qualified as unfair competition. In addition, comparative advertising that causes confusion with respect to the competitor's trademark, name (designation), and other distinguishing marks can also be considered as consumer misleading advertising by using a competitor's trademark (Law of Georgia on Competition, 2012).

It must be noted that only the manifestation of the prerequisites defined by Article 113 of the Law of Georgia on Competition should not be considered as exhaustive prerequisites for determining unfair competition. Thus, this is because the non-exhaustive list of prerequisites defined by the provision of the said article implies the possibility of considering other alternatives as well (Jorbenadze, 2022).

Accordingly, when evaluating the dishonest action of an economic agent, in the wake of the competition legislation, the trademark and advertising regulatory norms in force in Georgia should also be taken into account.

For the purposes of the Law of Georgia on Trademarks, a trademark is a sign or combination of signs that can be represented graphically and is capable of distinguishing the goods or services or both of one undertaking from those of other undertakings. At the same time, the law states that the sign may be a word or words, including proper names, letters, figures, sounds, a

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design or a three-dimensional figure, including the shape of goods or their wrapping and also other packaging, including colours or combination of colours (Law of Georgia on Trademarks, 1999). Based on the above, it is possible to conclude that the graphically represented symbol should be able to distinguish it from the signs denoting other goods and/or services, which fully corresponds to the standard established by the European Court of Justice (C-49/02 Heidelberger Bauchemie Gmbh [2004] ECR I- 6129; C-321/03 Dyson Ltd. v. The Registrar of Trade Marks [2007] ECR I – 687).

Of the two methods established worldwide for obtaining special rights to trademarks through the practice of trademark protection, which imply, on the one hand, obtaining a special right by actual use of the trademark, and, on the other hand, obtaining a special right to a trademark through registration of the trademark in the relevant institution, the Georgian regulation provides for only the second one. In particular, the acquisition of the right is effected through the registration of the trademark in Sakpatenti or on the basis of an international agreement (Dzamukashvili, 2012).

The Supreme Court of Georgia, based on the case law of the European Court of Human Rights, expands the rule of determining the moment of origination of the property right on the trademark provided by the national legislation. In addition, it connects the origination of the property right to the moment of registration (C-73049/01, Anheuser-Busch Inc. v. Portugal [GC], ECHR 2007-I) and, in some cases, to the registration application itself (Supreme Court of Georgia, Decision no. № ას-1285-1223-2014).

As for advertising, according to Georgian legislation, it is information disseminated by any means and form about goods, services, work, individuals and legal entities, ideas and initiatives, which aims to facilitate their sale (Law of Georgia on Advertisement, 1998). In addition, the goals of the law include the development of fair competition in the sphere of advertising, protecting public interests and the rights of advertisers and customers, and avoiding and preventing improper advertising. Accordingly, it is clear that the Law of Georgia on Advertising considers the consumer of advertising and the competing economic agent as subjects of protection of relations related to advertising. Hence, this is because confusing information provided by advertisers and distributors may mislead and/or harm them (Law of Georgia on Advertisement, 1998).

Accordingly, the competition regulatory legislation of Georgia stipulates the limitation of advertising activity, if it harms the interests of the consumer and the competing economic agent (Law of Georgia on Competition, 2012). However, the mentioned restriction does not affect the freedom of dissemination and expression of information established by the Constitution of Georgia (Constitution of Georgia, Article 17.1) because it can be limited when the expression threatens the principles and values declared

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and protected by the Constitution. In this way, the limitation of the constitutional right to ensure other legitimate good protected by the Constitution can be done (Giorgi Kipiani and Avtandil Ungiadze Against Parliament of Georgia, Decision no. №1/3/421,422; Decision no. №2/482,483,487,502). The Constitution of Georgia, along with the freedom of expression and dissemination of information, protects the development of competition and the rights of consumers (Constitution of Georgia, 1995).

For the purposes of the article, it should be noted that the Georgian National Competition Agency considers cases using only the Law of Georgia on Advertising. It also considers the Directive 2005/29/EC of the European Parliament and the Council of 11 May, 2005 concerning unfair business-to-consumer commercial practices in the international market (Directive 2005/29/EC, 2005) and Directive 2006/114/EC of the European Parliament and of the Council of 12 December 2006 concerning misleading and comparative advertising (Directive 2006/114/EC, 2006), as well as the practice of the Court of Justice of the European Union (Decisions of GNCA no. 04/279; no. 04/186).

Cases of Unfair Competition through the Social Network in Relation to the Trademark in the Practice of the Georgian National Competition Agency

In recent years, the GNCA has developed a rich practice regarding cases of unfair use of the trademark of a competing economic agent through social networks. The facts of unfair competition related to the trademark use, in many cases, are related to the dissemination of such information about a competing economic agent through social networks using inappropriate, dishonest, unreliable or obviously false advertising. Thus, this has created a wrong idea for the consumer and has encouraged certain economic actions.

The GNCA believes that social networks, such as Facebook, are one of the means of receiving information. Since the circle of potential customers of competing economic agents is most likely the same, a customer who is interested in purchasing one or another product or service may, after receiving false and/or negative information about the unfair use of another company's trademark through social networks, be misled and form a wrong idea about the product and/or service. This can lead to unhealthy economic actions (Decisions of GNCA no. 04/132 and no. 152).

The practice of the GNCA allows us to categorize the unfair use of the trademark according to the following groups: false and inappropriate advertising, use of the Internet domain, and dissemination of incorrect information.

Like international statutory acts and case law, the practice of the GNCA demonstrates that intellectual property rights play a significant role in

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determining misleading commercial practices by setting range of rules for protecting trademarks and other intellectual property assets from misuse in advertising and ensuring fair competition and consumer protection in the marketplace. False advertising often constitutes unfair competition, which is regulated by both intellectual property law and consumer protection laws. Unfair competition laws aim to promote fair business practices by prohibiting deceptive or misleading advertising tactics that give one competitor an unfair advantage over the others. False advertising that misuses trademarks can lead to confusion among consumers about the origin or quality of products or services.

Thus, determining unfair competition through digital platforms may often implicate false advertising that infringes trademark rights of competitor. To exemplify, a commercial practice shall also be regarded as misleading if the marketing of a product creates confusion with any products, trademarks, trade names or other distinguishing marks of a competitor (Directive 2005/29/EC, 2005).

False and Inappropriate Advertising

The Georgian National Competition Agency assessed the dissemination of misleading information through communication means, specifically by placing the registered trademark (logo) of a competing economic agent on the official Facebook page as Key Visual (KV), as false and inappropriate advertising. It is worth noting that the agency gave the same assessment to the use of the competitor's logo depicted in the photos and uploaded in the album located on the same page. This includes the publication of photos that confirms the image of the competitor's trademark on the anniversary cake (Decision of GNCA no. 152).

However, in relation to advertisement involving trademarks, false advertising claims require proof that economic agents are competitors. Core principle of relevant legislation states that economic competitors should not deceive consumers by misleading the use of trademark in ways that materially influence their purchasing decisions. Therefore, if advertisements involving trademarks are false or misleading and materially impact consumer decisions, the frames of unfair competition regulations qualifies as an infringement of intellectual property rights (Lemley & McKenna, 2010).

Use of Internet Domain

Regarding the violation of paragraph 2a of Article 11^3 of the Law of Georgia on Competition, an important clarification was made by the GNCA on the registration and administration of a website with a similar name owned by a competing economic agent with a similar website domain. Consequently, the GNCA considered that operating a website registered under a specific

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domain implies advertising activity. This is in the sense that it helps the user to make a certain choice because the website name, or domain address, is one of the factors that play a certain role by which the result will be chosen and the website the user will go to from the search engine. As the GNCA defines, the average statistical user has an objective expectation that the company's domain name matches the company's name, i.e., its trademark (Decision of GNCA no. 04/279).

Particularly, there are two types of confusion that are relevant to internet domains, namely: ongoing confusion and initial interest confusion. The difference in this type of confusion is determined by the consumer's behaviour upon visiting at the website. Ongoing confusion is seen when some consumers might be misled by unlawful sponsor of internet domain, and they may continue to conduct their transaction. Controversially, initial interest confusion occurs when consumer from search engine, upon arrival at the third-party website, return to their search results page to seek out the desired webpage (Goodstein et al., 2015).

In any case, infringement can be based upon confusion that creates consumer confusion, even though no actual transaction is finally completed as a result of the confusion (McCarthy, 2012).

On the other hand, the GNCA shares the approach of the EU Court of Justice (C-657/11, Belgian Electronic Sorting Technology NV v Bert Peelaers and Visys NV) and the EU Directive 2006/114 concerning misleading and comparative advertising (Directive 2006/114/EC, 2006). It was explained that the placement of different types of products and their features on the website domain, concerned by the user's purchase and/or choice, is clearly referred to as "presentation" of goods. Also, it can be taken as advertisement of goods, to which the rules governing unfair competition automatically applies (Decision of GNCA, no. 04/279).

Dissemination of Misleading Information

In relation to the trademark, the GNCA considers as misleading advertising the circumstance when a competing economic agent during advertising events, such as a video broadcast through a social network, phonetically pronounces the name of its company in such a way that the target consumer perceives it as a phonetically identical name of the competing economic agent (Decision of GNCA no. 04/130).

According to the factual circumstances established in this case, the appellant and the respondent economic agents operated in the same commodity market and represented each other's competitors in the market of car repair and sales of car spare parts. The GNCA discussed the similarity of the logos of the agents and determined that the logos of "G.T. Motors Ltd" and "GT Motors Ltd" differ from each other both in terms of color and shape,

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as well as in the graphic image printed thereon (see Appendix 1). Therefore, it is obvious that from the point of view of the average statistical objective user, differentiating these two logos is quite possible (Decision of GNCA no. 04/130).

As a result of studying the videos posted by "G.T. Motors Ltd," GNCA revealed that when talking about the company and the services or goods offered by it, "G.T. Motors" is referred to as "GT Motors." However, none of the video recordings mentioned that the company has any connection with "GT Motors Ltd." The GNCA has determined that when advertising the names of competing agents with similar phonetics and letters, it is important for the advertising agent to identify its own company as much as possible and to avoid any confusion with a competitor. The legal name of the undertaking is less relevant for the consumer; the commercial name under which it operates on the market and by which the consumer knows it is of importance. It is likely that similar cases are typical for economic agents that have similar trade marks before the confusion (Decision of GNCA no. 04/130).

We can conclude that the Agency has distinguished between the legal name of the company and its commercial name. In one case, two different legal names may be properly registered with different orthographic signs, and the graphic images may not match. Therefore, it should not cause confusion on the part of the customer, including when advertising products or services.

On the other hand, the Agency under the term "commercial name" considers both: a content (semantic) and sound (phonetic) meaning. Likewise, when the names of the undertakings are only slightly different from each other and they operate in the same market, the customer may get an objective impression that the market activity carried out by one of the companies, including advertising, is related to the actions of another company established and well-known on the market.

In addition, the Agency considers that the registration of graphically different trademarks does not, a priori, create a prejudicial circumstance regarding the fact that their phonetic confusion is excluded. In advertising, graphic (visual) and semantic differences cannot ensure the exclusion of the risk of false association between companies on the part of the customer. Accordingly, a ban was imposed as a sanction on the infringing party when it comes to advertising.

Through prism of intellectual property rights, confusion can occur where alleged infringer uses the trademark. This view is exemplified in different national and international statutory acts, i.e., Lanham Act, where "trademark use" is a direct and implicit requirement to determine infringement (15 U.S.C. § 1114(1.a)). However, likelihood of confusion is a more complex legal challenge for which the use of trademark or its composing elements are one of the aspects for determining infringement in the course of unfair

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competition and advertisement through social networks, search engines, online platforms, etc. However, this was proven in practice of GNCA mentioned above (McCarthy, 2008).

In addressing trademark infringement, circumstances must show that the alleged infringer used the competitor's trademark in a commercial communication. Under this analysis, it is explicit that the infringer's misconduct can create confusion among consumers without being considered a direct likelihood of confusion in using all comparators (phonetic, visual, and audio) (Palizzi & Simoni, 2012).

In this regard, it is worthy to mention that the American court decisions (Rosetta Stone Ltd. v. Google, Inc. (Rosetta Stone II), 676 F.3d 144 (4th Cir. 2012), Google, Inc. v. Am. Blind & Wallpaper Factory, Inc., No. 03-5340, 2007 WL 1159950 (N.D. Cal. Apr. 18, 2007)), in contrast to the European decision (Joined Cases C-236/08, C-237/08, C-238/08, Google France SARL v. Louis Vuitton Malletier SA), state that there is no burden of proof regarding the fact that the infringer used the trademark as a separate element from the traditional likelihood of confusion inquiry.

Exclusivity of the Decision of the National Competition Agency of Georgia No. 04/130 and the Difference with the Practice of the European Union

Regarding the determination of the degree of confusion between trademarks, practice that has been established in international and national proceedings requires that the likelihood of confusion must be determined globally, through the perception of the target audience and the evaluation of all relevant circumstances related to the case (C T-162/01, Laboratorios RTB v OHIM). For a likelihood of confusion to exist, the comparable trademarks must be similar or identical. However, the trademarks in question must cumulatively denote similar or identical services or goods (Case T 316/07, Commercy v OHIM). This implied that the low degree of similarity between goods and services neutralizes the identity of the trademarks in question (C-234/06, Ponte Finanziaria v OHIM). In addition, the visual, phonetic, and content (semantic) similarity of the signs is acceptable (T-323/14 - Bankia v OHMI).

The issue is regulated identically in the Georgian legal space, where the main criterion for determining the similarity of symbols during the comparison of opposing trademarks can be auditory (phonetics, musical sound), visual (graphics, color combination), and conceptual (semantics, essence) similarity of symbols. Finally, when comparing symbols, the overall impression is crucial (Order N05 of Georgian Intellectual Property National Centre, 2014). In particular, there is no obvious and eye-catching stylistic difference between the names of the appellation or trademarks of the National Intellectual Property Center of Georgia – Sakpatenti. In addition, their

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differentiation is impossible from a visual, phonetic, and semantic point of view. Cumulatively, they may be considered similar trademarks prior to confusion (Georgian Intellectual Property National Centre, Chamber of Appeals Decision No. №106-03/14). The area of use of the mentioned trademarks is also important, which refers to the peculiarities of perception and verbal expression of the trademarks in question by customer groups with different socio-linguistic characteristics (Case T-323/14, Bankia v OHMI). For comparison, Sakpatenti explains in one of the cases that it is important how the Georgian consumer pronounces the names of the competing trademarks (Georgian Intellectual Property National Centre, Chamber of Appeals Decision No. №106-03/14).

As a review of case law reveals, the phonetic element of a trademark plays an important role in determining the likelihood of confusion between comparable trademarks. Confusion of the symbols of the mark in question with an already registered trademark, which is determined by the "common impression", can be the basis for refusing to register the intellectual property right on it or prohibiting its use (Council Regulation (EC) No 207/2009, 2009; Law of Georgia on Trademarks, 1999).

Since, in case No. 04/130, there was no cumulative similarity of all three elements of the trademark (phonetic, semantic and visual elements), which causes the likelihood of confusion on the part of customers, the Agency could not establish the misappropriation of the trademark. In contrast to the above, the GNCA, using misleading advertising, considered confusion of the phonetic sound of the "commercial name" of a trademark that is different in terms of content and appearance as the sufficient fact for establishing unfair competition. The Agency considered confusion of one of the trademark distinguishing comparators as sufficient for determining unfair competition.

For reference, the Commercial Court of Finland considered the use of the identical word "Aarnio" in the name of a competing undertaking by an economic agent in an advertisement placed on its own company's website as misleading advertising (Case No MAO:25/20, Aarnio Design Oy). The Finnish Competition Court was guided by EU case law, which indicates that the use of identical transcriptions of the keyword constituting a trademark on the Internet creates a high likelihood of confusion among Internet users (C-278/08, Die BergSpechte Outdoor Reisen und Alpinschule Edi Koblmüller GmbH v Günther Guni and trekking.at Reisen GmbH, 2009).

Consequently, as to unfair competition in relation to unlawful use of competitor’s trademark, the likelihood of confusion is measured through balancing test calling for consideration of the harm derived from consumer confusion. In cases of descriptive or generic use of trademark or other distinctive signs, assessing lasting impression on consumers plays a crucial role in qualifying trademark infringement. Therefore, wrongful lasting

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impression caused by inappropriate use of trademark or other distinctive signs might be determined by the use of different components of trademark. Thus, cumulative presence is not required (Barnes & Laky, 2004).

Consequently, for the purposes of the competition regulatory legislation, the Agency did not take into account the rule of necessity of the cumulative presence of all three comparators to determine confusion between trademarks, which can be perceived as a precedent decision for both Georgian and international law (C-328/18 P, EUIPO v Equivalenza Manufactory; Case T-117/20, El Corte Inglés, SA v EUIPO; Decision of Polish Supreme Court no. I CSK 263/1).

Conclusion

Along with the development of the digital economy, the share of economic agents advertising their products and services through social networks and the Internet has increased, which is a global challenge. As a result of the above, during the consideration of disputes by the Georgian National Competition Agency, in many cases, it adopts international best practices. For example, it qualifies a domain as advertising for a trademark and it identifies inappropriate and false advertising through social networks.

The Agency has developed a different practice regarding the distribution of misleading information related to the trademark. Case law deliberated by the Georgian National Competition Agency (GNCA) sheds light on the nuanced aspects of trademark confusion, particularly in the context of advertising and commercial communication. The GNCA's decision underscores the importance of distinguishing between the legal name of a company and its commercial name, emphasizing the significance of the latter in consumer perception and market competition. In particular, for the purposes of competition, the Agency interpreted the company's "legal name" and "commercial name" independently of each other and determined that when the commercial name is used for advertising purposes, its graphic (visual) and semantic difference cannot ensure the elimination of the risk of false association between companies by the customer.

Accordingly, the Agency, for the purposes of determining unfair competition, considered confusion of one of the three established (visual, phonetic and semantic) comparators of trademarks as sufficient - thereby interpreting differently the rule of necessity of the cumulative presence of all three comparators to determine confusion between trademarks. Despite graphical disparities between trademarks, phonetic similarity and commercial context can still lead to consumer confusion, especially in advertising campaigns and social media platforms. Furthermore, the new approach reflects the complexities of trademark infringement and the evolving legal landscape surrounding it. While traditional assessments of likelihood of

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confusion typically consider all comparators (phonetic, visual, semantic), the case law demonstrates that confusion can arise even without the presence of all these elements, particularly in the realm of online advertising and commercial communication.

Comparative analysis with American and European court decisions further elucidates the varying legal standards regarding trademark infringement. While American courts have shown flexibility in considering trademark use as a standalone factor in determining confusion, European courts have upheld a more traditional approach that integrates multiple elements of confusion assessment.

In essence, the GNCA's approach in determining unfair competition in digital platforms underscores the need for a comprehensive understanding of trademark law and its application in the rapidly evolving landscape of advertising and commercial communication, both domestically and internationally.

Presented findings urges to emend couple of international statutory acts, including Directive 2005/29/EC, commonly known as the "Unfair Commercial Practices Directive." This aims to regulate unfair business-to-consumer commercial practices within the internal market of the European Union (EU) and European Economic Area (EEA).

To ensure avoidance of misleading or deceptive practices regarding trademarks and trade names used in commercial activities through social networks, it was suggested to revise provision of article 6.2 of the Unfair Commercial Practices Directive. Specifically, commercial practice shall also be regarded as misleading “if, in its factual context, taking account of all its features and circumstances including presence of the likelihood of one of the following comparators autonomously (phonetic, visual, semantic), it causes or is likely to cause the average consumer to take a transactional decision that he would not have taken otherwise, and it involves: any marketing of a product, including comparative advertising, which creates confusion with any products, trademarks, trade names or other distinguishing marks of a competitor.”

Preferably, the preamble of Directive 2006/114/EC of the European Parliament and of the Council of 12 December 2006, concerning misleading and comparative advertising, should encapsulate statement regarding comparative advertising as follows: “use of competitor's trade mark, trade name or other distinguishing marks breach this exclusive right in cases even if it complies with the conditions laid down by this Directive, but the intended target is not able to solely distinguish between them and thus confusion arise by the presence of the likelihood of one of the following comparators autonomously: phonetic, visual, semantic.”

Furthermore, to ensure legal foreseeability and clarity on national levels, states should undertake respective legislative actions to determine that

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misappropriation and creating an incorrect impression regarding competitors' products implies infringement of "trademark, trade name, and other distinguishing marks." Consequently, the Law of Georgia on Competition should be amended in a way that ensures inclusion of "trademark, trade name, and other distinguishing marks" as independent, explicit ground for unfair competition and misleading advertising. Emphasis should be placed on the autonomous presence of phonetic, visual, and semantic comparators of trademarks, trade names (commercial name), and other distinguishing marks. Lastly, it is recommended to consider adding clearer definitions or distinctions between "legal name" and "commercial name" of trademarks, especially in the context of advertising purposes on the national and international levels. This can help in providing better guidance for determining unfair competition.

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Appendix 1.

ESJ Humanities Peer-reviewed

Buried treasures and ancient forges: a historical analysis of mines and ironworks in the Stilaro Valley

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Abstract

This study aims to delve into the mines and ironworks of the Stilaro Valley and the ancient ironworking processes that occurred there. Up until the late 19th century, the area encompassing the municipalities of Bivongi, Pazzano, Stilo, Fabrizia, Mongiana, and Guardavalle stood as one of southern Italy's foremost centers for iron production and mining. Drawing upon archaeological, historical, and archival sources, this research seeks to enrich our comprehension of the economic and industrial activities that define this region. Utilizing techniques such as direct source study and cross-referencing with literature on the subject, this investigation has consulted archival documents stored in the State Archives of Naples and the State Archives of Catanzaro. The historical and geological backdrop of the Stilaro Valley furnishes an insight into its mineral wealth and the intricate mining and ironworking undertakings spanning centuries. Historical evidence, bolstered by significant discoveries, suggests an ancient tradition of metalworking in the area, with its influence extending into Magna Graecia. The scrutiny of mines and ironworks unveils a nuanced dynamic of adaptation and interaction among ancient communities, whose migrations and settlements were shaped by the natural resources and economic prospects offered by the region. The significance of mines and ironworks transcends mere economic and industrial development; they also profoundly influenced the cultural and social fabric of ancient and medieval Calabria. Initiatives like the Ecomuseum of the Ironworks and Foundries of Calabria underscore the imperative of conserving

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and promoting this historical and industrial legacy for generations to come.

Keywords: Iron and steel history of Southern Italy, Mines, Ironworks and Foundries, Economic History, History of Industry

Introduction

Until the end of the 19th century, the Calabrian territory, comprising the municipalities of Bivongi, Pazzano, Stilo, Fabrizia, Mongiana, and Guardavalle, represented one of the most significant iron and mining centers in southern Italy. At different times, three weapon factories, thirty ironworks, and two foundries were active in this area. These establishments processed limonite extracted from deposits located in the mountains of Stella, Mammicomito, Petracca, and Consolino.

Currently, thanks to new knowledge acquired through the study of archival documents and modern research, we can further deepen our understanding of this ancient ironworking process and related mining activities. These new sources and methodologies allow us to shed light on previously obscure or little-known aspects of this important economic and industrial activity that characterized the region.

The hypothesis is supported by several significant archaeological findings. In the site of the 9th-century B.C. necropolis at Sant'Onofrio (Nenci, G., 1988), near Roccella Ionica, iron objects have been found, indicating an ancient presence of metalworking in this region. Furthermore, discoveries dating back to the Bronze Age in the Stilaro area and others from the Greek-Roman period (Franco, D., 2003), in the surroundings of Pazzano and Stilo, provide further evidence of ironworking and metallurgical activity in the area (Fiorenza, E., 2022; Fiorenza E., 2023).

The presence of a "culture" of ironworking in Calabria is clearly of importation, indicating a flow of knowledge and metallurgical practice from other regions. The mineral wealth of the valley, spanning the Aspromonte and the Calabrian Serre, has always attracted diverse populations that settled in mineral-rich areas to exploit their resources.

The earliest populations to take an interest in the mineral resources of the Calabrian territory likely came from neighboring Iapygia. These populations, having abandoned the Salento Peninsula at the end of the Bronze Age, settled in Calabria, drawn by pastures and iron deposits, which they began to exploit more intensively than the indigenous populations.

This archaeological and historical evidence supports the idea that the mineral resources of Calabria played a significant role in the development of ancient communities and in the settlement of populations from other territories, contributing to the formation of a complex cultural and industrial landscape in the area.

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The hypothesis of a sudden immigration of populations from neighboring Puglia is supported by the presence of significant archaeological findings related to the Bronze Age, which testify to a civilization strongly linked to metallurgy. Conversely, findings attributable to the Iron Age are extremely rare in this area. This contrasts with the situation in Calabria, where the opposite is observed: few artifacts dating back to the Bronze Age, but numerous artifacts from the Iron Age.

It is hypothesized that the scarcity of raw materials, especially iron minerals, forced these populations to seek new lands rich in iron deposits. These deposits would have allowed to produce technologically more advanced weapons and artifacts. This migratory movement would have led them to Calabria, where there was already some mining exploitation and where indigenous populations had long been producing iron artifacts.

This phenomenon reflects a complex dynamic of adaptation and interaction among ancient peoples, whose migrations were influenced by the natural resources and economic opportunities offered by different regions.

The Geography of the Stilaro Valley

The territory adjacent to the municipality of Stilo, located on the Ionian slope of the Calabrian Serre, can be identified, for its history, as the richest mining area of the Kingdom of Naples. It is known for its extensive deposits of iron minerals and for the presence of lead, silver, and gold. In addition to the natural richness of the subsoil, the region benefits from the typical geomorphological conformation of the countryside, characterized by vast forests and numerous seasonal watercourses, which facilitate the processing of minerals on-site. These elements provide both the necessary fuel and essential hydraulic energy for the operation of the early rudimentary smelting plants.

The mines of Stilo, presumably active since the 7th-8th century BC by the indigenous population (Orsi, P., 1926), are mentioned for the first time in 1094, in a charter granted by Count Roger II of Sicily to the community of Carthusian monks of Santo Stefano del Bosco (Tromby, D.B., 1773). Subsequently, in 1313, these mines are cited in an edict by Robert of Anjou, who, in confirming the ancient donation, orders that the monks not be disturbed in the extraction process of the "iron vein" by state officials present at the port (Orsi, P., 1926).

The geological conformation of the Stilaro area (Bova, D., 2008), although partly known, has not yet received a thorough and detailed study. This area includes the territory of Stilo and Pazzano, along with the Consolino and Stella mountains, which extend to the Ionian Sea.

The organization of the geological layers, highlighted through normal terrain cuts, particularly those carried out at the Campanaro locality, where the

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Monasterace-Pizzo national road turned westward, shows the following arrangement: the Quaternary or Neozoic group extends mainly downstream, from the roots of Mount Consolino to the sea; the Tertiary or Cenozoic group includes the Pliocene, Miocene, and Eocene systems; the Secondary or Mesozoic group presents Cretaceous, Jurassic, and Triassic systems; finally, the Primary or Paleozoic group hosts limestone, limonite, arkose, phyllites, graphitic schists, mica schists, phyllitic gneisses, and gneisses, with granite forming the central backbone of the Apennines (Cunsolo, L., 1965).

The ironworking region can also be divided into two mountain masses with approximately identical geological structure: the Stella and Consolino mountains. The latter of these, located to the east and north of the Stilaro Valley, extends normally with respect to the former towards the southwest; however, it is separated from Mount Stella by a narrow gorge, just over a hundred meters deep, close to the north by a terrace formed by grayish phyllitic rocks tending towards turquoise, with variations of yellow and brown due to the presence of limonite, derived from iron and its compounds under the influence of humidity.

This terrace rises from the roots of the Stella and Consolino mountains and extends northward into a short plain, upon which the town of Pazzano stands, which unfortunately continues to lose population steadily. Subsequently, the plain slopes down and descends into other terraces, characterized by olive groves and vineyards, until reaching the bed of the Stilaro stream, where, on the western slope of Consolino, lies the town of Bivongi.

Near the municipality of Bivongi, whose name seems to indicate the place where iron was tempered, and "Bingi" (Bova, D., 2008), an ancient hamlet now disappeared, believed to have been indigenous centers dedicated to mining exploitation or possibly founded specifically in Greek times for the same purpose, there is still a locality called "Argentera" today. Opposite it is the locality "Argalia," where on the same site in 1274, the Cistercian monks built a facility, a "mulin de fer," used not to grind wheat but to crush the ore, in this case galena, extracted from the adjacent mine called "argentera" (Franco, D., 2008). Currently, on the site, there are the remains of a tannery built in the early 20th century over a pre-existing ironworks.

The ruins of the latter were probably visible and substantial before the construction of the tannery, as reported by the priest Giuseppe Raspa in one of his works:

> «*As for the silver lead, there is, however, in the vicinity of Bivongi, a locality called Argentiera because of the mines that in the past were exploited for the extraction of the mixed metal. A short distance away, in a short distance, there are also the ruins of the furnaces used for the*

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processing of the raw ore and the refinement of the individual segregated metals» (Raspa, G., 1911).

Along the Assi stream, previously known as "the river of silver," there is a locality called "argentina" (Bova, D., 2008). On the middle-upper stretch of the Stilaro, there persists a region identified as "angra do Furnu." Along the course of the "Melodare" stream, the locality "Argastili" is identified, suggesting the operation of a workshop during the Greek or Byzantine era (Rohlfs, G., 1974; Franco, D., 2003; Rubino, G. E., 1978).

The area shows traces of ancient iron workings in the localities of "Pietra," in the municipality of Placanica, and "forno" near Camini. This municipality, originally known as Kaminion, which derives from Greek and means chimney or furnace, takes its name from the ancient furnaces used to produce ceramic artifacts. This village developed as a hamlet of Stilo around the 7th century, a period of prosperity for the area. In Contrada Jeritano, near the coast, a pit grave dating back to the 6th century BC has been discovered, attributable to a Bruzian farmstead (Mollo, F., 2018).

The national road that passes through Pazzano connects significant inland centers, including Stilo, Mongiana, and Serra San Bruno, stretching from the Ionian Sea coast at Monasterace to the Tyrrhenian Sea at Pizzo Calabro. This main artery follows the slopes of the Consolino and Stella mountains, gradually ascending, while the limestone of the Stilo massif gives way to the granite of the mountain. Beyond a thousand meters, the vegetation transforms into a dense forest of elms, beeches, and firs, but the deforestation activity of forestry companies continues to negatively impact the hydrometric conditions of the underlying region.

The road presents the same schistose rock formation as Pazzano. In some sections, the limestone present on the slopes and peaks of Mount Stella has caused landslides and accumulations that cover the schist.

In ancient times, Stefano Czyskoswki conducted an analysis on some mineral samples found along the road from Stilo to Pazzano, obtaining the following results: iron 0.90%; manganese 6.10%; zinc 0.80%; phosphorus 0.028%; silicon 1.50%; calcium 46.50%; aluminum 1.10%; magnesium (traces); iron loss 36.60% (Cunsolo, L., 1965).

Mines in the Stilaro Valley: analysis between ancient and contemporary times.

Regarding the mines in the Stilaro area, now completely abandoned and inaccessible, Cunsolo, citing Crea, states:

«*It is said that in past centuries, on the hills beyond the Stilaro exposed to the south, there was an ancient silver mine, as still suggested today by the name preserved in the locality, called the Argentiera. It is said that on the slopes of a limestone mountain overlooking Stilo, precisely*

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> *in the place indicated as S. Giorgio, another gold mine was discovered and explored in the past. However, beyond the uncertain traditions, there are neither traces nor documents of either, or it is concluded that no benefit, apart from the expenses incurred, justified their abandonment. A more recent event, dating back about nine years ago, in 1832, testifies that after abundant rains significant landslides occurred in the territory of Pazzano, from which important veins of silver lead emerged, collected by many inhabitants of the surrounding municipalities. In several points of the indicated territories, this mineral manifested itself, but in the mentioned localities, it was more abundant and purer*» (Cunsolo, L., 1965).

Cunsolo offers a comprehensive overview of the ancient mines in the Stilaro area, elucidating the traditions and legends surrounding the extraction of silver and gold in the region. However, the author criticizes the absence of concrete evidence concerning these historical mining activities, cautioning that many of them are legendary or inadequately documented. Moreover, mention is made of more recent occurrences, such as the landslides of 1832, which revealed veins of silver lead, underscoring the significance and unpredictability of mining resources in the region.

In the hinterland of the valley, on the slopes of the Stella, Consolino, and Mammicomito mountains, there were approximately thirty mine shafts until the last century, sadly, only a few of which remain visible today. This substantial number bears witness to the paramount importance of this mining basin for the entirety of southern Italy. Activities associated with resource extraction trace back to ancient times. Metalworking, which proliferated in Calabria around 1000 BC, purportedly due to the efforts of Mycenaean navigators, was further refined by the Enotri. They commenced exploiting surface deposits of materials like copper, silver, and iron found in the region.

In addition to the well-known mine in Pazzano, located along the Mines Road at the entrance of the town, there is the Grande mine in the municipal area of Bivongi, situated on the western slopes of Mount Consolino. Nevertheless, many other mines have disappeared over time, mainly due to a lack of protection and changes in the territory, often caused by landslides and widespread collapses throughout the area. Recently, along the road leading to Ferdinandea, during some redevelopment work on the national road leading to Serra San Bruno, the municipal administration chose to wall up a mine shaft, commemorating it with the installation of a metal plaque on the closing wall. Even today, along the Mines Road, fragments of smelting slag can occasionally be found, silent witnesses to the mining activities that have characterized the area.

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The historical reconstruction of the mining and metallurgical activity in the upper Locride is extremely complex due to the scarcity of available data. In antiquity, the area was renowned for the production and processing of metals, particularly bronze. Paolo Orsi, a prominent archaeologist in Southern Italy at the beginning of the 20th century, is known for discovering the oldest ironworking site in the Stilaro Valley. During archaeological excavations in the Magna Graecia city of Kaulonia, the scholar discovered the remains of a processing environment, presumably a workshop, along with artifacts such as iron spearheads and arrows, as well as numerous smelting residues.

These findings, particularly the slag, now housed in the storage of the State Antiquarium of Monasterace (RC), are of particular interest as they confirm the hypothesis that Greek settlers in Kaulonia may not have imported iron from other regions but rather worked it locally, using the raw material from the inland mines.

These mines, presumably cultivated by local indigenous people, would have constituted an essential source of raw material, exchanged with the Greeks to produce utensils and artifacts.

The foundation of the polis of Kaulonìa, starting from the 8th century BC, marked the beginning of systematic mining activities and intense commercial exchange between the indigenous populations of the hinterland, engaged in mineral extraction, and the new coastal colonizers equipped with the technological skills to produce high-quality artifacts.

Metallurgical activity, particularly the production of iron and silver, played a significant role in generating an economic surplus that allowed the allied polis of Kroton to achieve a remarkable degree of development. This progress was also reflected in the issuance of silver coins depicting figures such as Apollo and the deer.

Testimonies of the cult of Apollo are plentiful in Magna Graecia, exemplified by artifacts such as the Delphic tripod in Croton, which is attributable to the period of the colony's foundation under the patronage of Apollo. However, interpretative ambiguities persist among scholars, awaiting new discoveries that may shed light on these aspects.

The bronze emissions of Caulonia pose interpretative challenges, with hypotheses suggesting the inception of coinage shortly before the city's destruction by Dionysius and a possible reinstatement during the Hannibalic period. The presence of a male head, interpreted as that of a river deity like the River Sagra, suggests a dating prior to 389 BC. Archaeological and numismatic evidence cited by various authors supports this hypothesis. (Gorini, G., 1975; Gagliardi, V., 2007; Gargini, M., 2004).

The coinage of Caulonia is a highly debated aspect in the history of Greek numismatics, yet its understanding remains subject to ongoing

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interpretations and analyses. Currently, there is no definitive sequence of dies nor an unequivocal identification of the coin types.

The earliest emissions of Caulonia include incuse staters, weighing about 8 grams, following the standard of the Achaean colonies of southern Italy. These emissions are divided into three series, with the first dating back to around 525 BC. They feature a nude statuary god in profile, holding a laurel branch in the raised right hand and extending the left arm, upon which a backward-facing male figure is depicted. Next to the god is a stag, also with its head turned toward the deity.

The scene on the coins of Caulonia is debated. Apollo is identified on the obverse, but the running figure has had different interpretations over time. The deer, also present on later coins, evokes Artemis. The name Kaulonía could derive from "aulon," valley or ravine. (Lepore, L., Luberto, M. R., & Turi, P., 2013). Moreover, in the area between the monastery of San Giovanni Therista and the Grancia dei SS. Apostoli, in the municipality of Bivongi, quarries of green and pink marble have been discovered. These varieties of marble were used to decorate the altars of the churches in Stilo.

Grimaldi, in his "Record of the mines of Stilo that under the glorious government of S. M. Cattolica from the year 1748 to the year 1756 were worked, discovered, or at least revealed," provides important historical documentation on the marble mining in the region during the period between 1748 and 1756. This document reveals the economic and cultural significance of marble extraction and processing in the Stilo area during that historical period. (Cunsolo, L., 1965).

The text also provides a detailed list of the mineral resources present in the «*Territory of Stilo:*

- *A silver mine, located in the Assi del Notare district, producing 10 ounces of silver and a cantajo;*
- *An antimony mine, nearly massive, also in the Assi district, which is abundant in revenue;*
- *A mine of sulfur, vitriol, and alum, in the said district, consisting of marcasite, which also yields little copper;*
- *A stone salt mine, in the Gangia di S. Leonte district, revealed but not fully uncovered;*
- *A very rich silver mine in the Stilo mountain, revealed but not fully uncovered;*
- *A mine of precious marbles of all kinds and colors under the Stilo mountain*». (Grimaldi, F.A., 1781; Cunsolo L, 1965).

The list of mining resources in Stilo reveals significant economic potential, with some mines identified but not yet fully explored or exploited.

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The actual yield of the mentioned mines, as reported by Grimaldi and transmitted by Cunsolo, remains uncertain as we do not have reliable quantitative data. However, the presence of ironworks in Stilo has been known since the Norman times. In the document of William, King of Sicily, dated 1173, the ironworks are mentioned along with other concessions, indicating the importance of mining activity in the region with the words «*et libertatibus minerae aeris et ferri*» (Cunsolo, L., 1965).

During the Byzantine-Norman era, the economy of the Stilaro Valley was primarily based on agriculture, sheep farming, and silk farming. The documented centers of industrial production were limited, including numerous mills (as many as 16) along the streams and some facilities for the processing of lime, bricks, and iron. (Franco, D., 2006).

This description of the local economy reflects a complex picture in which mines represented a significant but not exclusive component of the economic activity in the Stilaro region. The presence of ironworks and other industrial activities indicates economic diversification; however, mining activity likely had a significant impact on the economy and development of the area.

In 1523, several ironworks were active in various locations in Calabria, including Campoli, Caulonia (Castelvetere), Stilo, Spadola, Trentatarì, Furno, and others. These ironworks were granted by Emperor Charles V to Cesare Fieramosca, brother of the more famous Ettore Fieramosca. The Stilo ironworks was already operational in 1526, as indicated by the visit of the Bolognese friar Leandro Alberti to Calabria in that year (Alberti, L., 1550).

History highlights the importance of ironworking activity in the region during the Renaissance, with ironworks being essential to produce iron and other metallic materials. The granting of ironworks to Cesare Fieramosca underscores the connection between local economic activities and prominent figures of the time, while the presence of the Stilo ironworks in 1526 confirms the continuity of such activity in the Calabrian region.

In December 1527, the Stilo ironworks became part of the royal demesne for reasons of public utility, while the other ironworks were leased to Jacopo de Russis by King Ferdinand I of Aragon. In 1601, the descendants of Fieramosca leased the ironworks to a member of the Ravaschieri family, but about twenty years later, they decided to regain possession of them, and since then there are no more documents attesting to their history.

However, in 1642, the Princess of Scilla, owner of a third part of these ironworks, received some fiscal properties from the government in the tenure of Atti in Abruzzo, in compensation for her third part that the government subsequently acquired (Falcone, N., 1846).

Mining activities in the Stilaro area experienced an interruption at some point, but the reason or the exact period of this pause is not clear.

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However, in 1754, they were resumed, and structures for the smelting of the extracted material were built. During the seventeenth and eighteenth centuries, the steel complex of Mongiana developed, which included all phases of ore processing, including smelting in blast furnaces.

The return to mining and smelting activities likely responded to a growing demand for metallic materials and the increase in resources and technologies available to exploit local mines. The steel complex of Mongiana, recently restored, attests to the historical and industrial importance of the area, which played a significant role in the economic and industrial development of the region during that period. (Fiorenza, E., 2024)

Mongiana represented an important industrial hub where both civilian goods, such as railway tracks, and military goods, such as the famous Mongiana rifle and cannons, were produced, with a specialized factory in the territory of Pazzano. The limonite ore, extracted along the north-western slopes of Mount Stella, had already been exploited by the Campoli ironworks since the early 16th century.

Campoli, presumed to be near the areas of Campoli Cerasara, Campoli Sambucato, and San Todaro in the municipal territory of Caulonia, was an important center for processing limonite ore (National Library of Naples).

This industrial context highlights the complexity and diversification of mining and ore processing activities in the region, with production destined for both civilian and military markets, thus contributing to the economic growth and industrial development of the area.

In 1768, the ironworks were relocated to the areas of Mongiana and Ferdinandea, presumably due to the greater availability of wood necessary for the furnaces nearby. However, material extraction continued in Pazzano until the early decades of the second half of the 19th century, when the Bourbon dynasty fell, and the new government, applying Piedmontese laws to the entire kingdom, ended all industrial activities in Southern Italy (Fiorenza, E., 2023).

The Ecomuseum of Ironworks and Foundries of Calabria, established in 1982 by the Calabrian Association of Industrial Archaeology (ACAI) led by Danilo Franco, a pioneer in the industrial archaeology of the region, was created to protect and promote this vast heritage. One of its main attractions is the mining basin of Pazzano, which meets the need to safeguard and enhance all the forest, mineral, hydrogeological, infrastructural, landscape, and monumental resources of the territory.

Within the Ecomuseum, there is a project for an Archaeo-Geo-Mining Park of Mammicomito, along with planned interventions to create trails and make the Regina, Regina Ribasso, Italia, Piave, Melichicchi, and Umberto I mine accessible.

Evidence of mining activity manifests in various ways, highlighted by the remains of ancient furnaces and mines dating back to the classical period,

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medieval material dumps, and the imposing ruins of modern mines. These artifacts represent extraordinarily significant traces of the history of extraction techniques, material processing, and the events of the local communities involved.

The imprint left by mining activity is so significant that it is also evidenced by the Naturalistic Mining Park of Gavorrano, which serves as a tangible monument to the mining and industrial tradition. This park not only preserves the remnants of the past but also provides an educational and informational context that illustrates the crucial role that mining has played in the history and development of local communities.

The visit to the park offers a complete immersion into the cultural roots related to mining activity, providing a detailed environmental and human overview of life during the exploitation of underground resources. Despite efforts, the historical reconstruction of the mining and metallurgical production of the area is still ongoing and far from being completed.

The earliest phases of mining activity are still partly undocumented, although numerous indicators of intense and continuous metallurgical production are evident. While knowledge of deposits and mines is well-defined for the post-medieval period, especially for the period between the mid-18th century and the first half of the 19th century, many details remain to be explored and understood regarding earlier phases. Research and continuous study are essential to fill these gaps and gain a more complete and accurate understanding of the mining history of the region (Clemente, G., 2013).

Steel Complex on the Assi River

The steel complex of Assi is located between the provinces of Reggio Calabria and Catanzaro. This center of metallurgical processing, closely linked to the nearby Stilo, played a significant role in steel production throughout the 18th century.

It takes its name from the Assi river (Bova, D., 2008), a crucial hydrographic feature around which the main buildings of the site were erected. The choice of location for the steel complex is not random but responds to precise technical and logistical needs inherent to the steel industry. The area exploited local natural resources, especially the water from the Assi, for metalworking operations. This water not only generated hydraulic energy to power machinery such as hammers and anvils but was also vital for the cooling and processing of metals. The proximity to the river facilitated the transport of raw materials and finished products, a crucial aspect considering the limited transportation systems of the time.

The steel complex represents a significant example of early development in Calabria from a historical and industrial perspective. In the 18th century, it played a key role in the local and regional economy, promoting

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industrialization in a predominantly agricultural and rural area. Its presence highlights technological advancement and the application of engineering in metalworking at a time when such practices were still in development.
The overall structure and its components, including mining extraction sites and various ironworks, present a picture of historical-economic interest.

Components of the complex:
The Ironworks: Francese, Zessi, San Carlo, Ropalà, Maglietto (Fiorenza, E., 2019);
The Old Ironworks of Stilo, consisting of Arcà, Acciarera, Armi, Murata, Nuova, Molinelle di Sotto, and Molinelle di Sopra (Fiorenza, E., 2023).

It is a diversified and geographically extensive production network, whose mention of both civil and military use underscores the dual function of the complex: providing tools and materials for daily life and supporting the war industry, crucial in that historical period.

Additionally, there were some additional structures:
The Lamberti Arms Factory.
The Royal Furnace of Pazzano (Franco, D. 2019).

Reports of new silver and argentiferous lead mines, as documented by Grimaldi (Grimaldi, L., 1845), along with the discovery of the Antimony mine, testify not only to the abundance of resources on the surface but also to the progress made in the geology and mining exploration of the time (Falcone, V., 2007; De Stefano Manno, B., 2008).

The arrival of workers from Germany and Hungary, led by experts such as Professor Hermann and engineer Bruno Maria Schott, facilitated a significant exchange of knowledge and skills at the European level in the fields of mining and metallurgy. Schott, through his detailed work on mines and mineral veins, introduced a scientific and systematic approach to the mining industry. The loss of his documents, as emphasized by Carminantonio Lippi, represents a gap in the mining and industrial history of the region.

The Assi steel complex stands as an emblematic example of industrial development during a period of technological transformations and interactions between productive sectors and European regions. It had a profound impact on the economy and society of Calabria, contributing to the evolution of mining and metallurgical technology in Europe. During the 1760s, the Stilo Ironworks recorded a considerable production of iron, totaling 1,034 tons over six years. In 1776, the overall iron production peaked at 308,451 kilograms, underscoring the productive efficiency of the Stilo ironworks and their significant role in the steel industry of the time. (Franco, D., 2003).

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Iron Production at the Stilo Ironworks:

Ironworks	Iron Production in kilograms
Arcà	56782
Acciarera	45123
Armi	36846
Maglietto	29900
Murataa	44500
Nuova	51000
Molinelle di sopra	23500
Molinelle di sotto	20800

Lamberti Arms Factory

The "Regia Fonderia Cannonum Civitatis Stili" (Franco, D., 2019), more commonly known as the Lamberti Arms Factory, was an important industrial institution established in 1746 (Franco, D., 2019). Situated along the Assi stream within the boundaries of Stilo, it was initially conceived under the direction of Giuseppe Lamberti. A landmark in the production landscape of the time, it stood out as the second armaments factory of the Bourbon Kingdom, indicating the strategic importance and technological advancement achieved in this sector during that historical period. Intended to produce artillery, it was designed to annually manufacture a total of 70 large-caliber iron artillery pieces (cannons) and 45 small-caliber ones. However, due to technical complexities and management issues, this ambitious production target was never effectively met. The situation culminated in 1752 when the Lamberti factory faced economic failure (Franco, D., 2019).

The Lamberti family, once influential in Calabria, experienced a failure that appears to have been orchestrated by more powerful entities closely aligned with the center of power in Naples. Bonaventura De Marco, an entrepreneur who later became a naturalized citizen of Bivongi, emerged as a central figure in this scenario. His rise began with the Lamberti's downfall, after which he took control of the Assi ironworks in 1753. De Marco's ability to navigate the political and economic landscape of the time, along with his understanding of government industrial plans, were crucial in this process.

De Marco, based in Naples, was aware of significant government investments earmarked for industrial development, particularly about 300,000 ducats allocated to the hydraulic aspect of the ironworks, equivalent to around 30 million euros today. He was also privy to the plans of the architect Vanvitelli, which envisioned the use of the Assi ironworks to produce 50 km of pipes for the Carolino aqueduct, the fountains of the Caserta Royal Palace gardens, and the Royal silk mill of S. Leucio. (Franco, D. (2019).

This setback, however, was not in vain, as it spurred renewed interest from the Crown in industrial development in the steel sector. Thus, the failure

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of the Lamberti factory played a decisive role in directing the Bourbon royals' attention towards the realization of a larger and more ambitious project: the creation of the Mongiana steel complex (Fiorenza, E. 2023). This new facility would represent a significant leap forward in the Kingdom's steel production, combining technological innovations with more efficient production organization, positioning itself as one of the main metalworking centers of the time.

Mines of Bivongi

The mines located in the territory of Bivongi delineate a complex of mining sites that historically have been exploited for the extraction of a variety of minerals (Cuteri, F.A., 2020). These deposits were known for their abundance of galena and molybdenum.

In addition to these, other extracted minerals included chalcopyrite, a mineral containing copper and iron. The mining sites of Bivongi were significant for extracting minerals used in industry and metal production. Extraction techniques varied over time and with available technologies, influencing the local and regional economy. Over time, extraction operations became more advanced, transitioning from manual methods to techniques involving machinery and chemical processes. These activities contributed to industrial development but also created environmental and health problems for workers due to the hazardous nature and pollution from mining operations.

Mining exploration and exploitation in Calabria have ancient roots, dating back to the era of ancient Greece, with mines known for the extraction of silver, used, as we have seen, for the minting of coins like the Incuse Staters of Caulonia.

The name "Argentera" highlights the long tradition of silver-related mining activities in that locality (Franco, D., 2003).

In 1782, Calabria Ultra boasted a total of 42 mines, with 23 dedicated to silver extraction in combination with lead, positioning Bivongi and other locations as key centers in a silver-bearing district (Cunsolo, L., 1965).

The interest in the region's mineral resources has not waned over the centuries. The presence of molybdenum, for example, was detected in 1893 and attracted the attention of several companies throughout the twentieth century (Cuteri, F.A., 2020). The research and exploration conducted by entities like Torelli and Re in 1917 and later by Breda in 1939 demonstrate a continuous interest in the area's mineral wealth. The opening of approximately 60 mines in various municipalities of Calabria represents a broad attempt to exploit these resources (Franco, D., 2003).

However, the mining history of the area is marked by ups and downs, with periods of intense activity followed by phases of stagnation or cessation. The interruption of mining operations during World War II and the subsequent

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failure to resume activities by Breda raise questions about the operational, economic, and perhaps even political challenges encountered in this sector.
The studies conducted by the Sila Studies Center in 1948 and the establishment of Mineraria Calabra in 1951, an initiative of Montecatini and the Sila Authority, were attempts to revive the mining industry in Calabria but were unsuccessful due to the difficulties and complexities in the use of the territory (Franco, D., 2003).

The mines currently known in the territory of Bivongi are Cava, Frana, Garibaldi, Gattaraghi, Giamba, Giolli, Paoli.

The exploration and exploitation of the mines in the valley demonstrate the richness and complexity of the region's geological and socio-cultural history, illustrating the evolution of mining techniques and local society over the centuries.

The Laveria Flotation Plant

The Laveria flotation plant, located near the Stilaro river, was dedicated to processing molybdenite ore. Located in the Perrocalle (or perhaps Vignali?) district, it stood on a small hill and operated actively until the 1950s. The structure, originally divided into three floors, each dedicated to a specific phase of the flotation process.

The molybdenite ore was transported to the plant via a cableway, an efficient solution for difficult terrain. On the first level, it was crushed and cleaned to remove impurities. Flotation separated the molybdenum from other substances, obtaining a pure concentrate, which was then stored for transportation or further processing.

The upper floor of the plant, once a center of intense industrial activity, has been converted into a restaurant. This adaptation serves as an example of the reuse of abandoned industrial structures for new purposes, a practice common in many parts of the world where industrial heritage is repurposed for commercial or cultural purposes.

Mines of Pazzano and Bivongi

The mines of Pazzano, in Calabria, were significant for the regional mining industry, especially for pyrite. These mines, now inactive, were crucial for the local mining industry, exploiting important geological resources such as iron minerals. Pazzano is known for its mineral deposits, especially of iron minerals (Accademia dei Lincei, 1911).

Mining operations in this area employed both open-pit and underground methods, adapting to geological conditions. Advanced technologies and mining engineering practices were employed for efficiency and safety. However, factors such as the depletion of deposits and global economic changes led to the closure of the Pazzano mines. The remaining

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mining structures have been integrated into the Ecomuseum of Ironworks and Foundries of Calabria, preserving history and offering a window into the local industrial past.

History tells the story of the evolution of mining and ironworking in Calabria, with periods of intense activity followed by phases of decline, reflecting the economic and political dynamics of each era.

A list of known mines in Pazzano: Explosives deposit (former church), Principe Ereditario ('700), Carolina ('700), S. Ferdinando ('700), Regina, Noceto, Scolo, Galleria Italia (Mount Stella at 370 m. altitude), Galleria Piave (at 430 m. altitude), Galleria Acqua Calda, Contrì, San Giuseppe, R. Principe, Colle di Banno, Lucarello, S. Maria, Perrone, Gotto, Perronello, Clementina, Clementina II, San Carlo, San Nicola, Campoli, Garibaldi, San Luigi, Grotta Nuova, Provvisoria, Regina Ribasso, Melichicchi, Umberto I.

The mines of Bivongi, alongside those of Pazzano, have historically been used to extract galena, molybdenum, and other minerals such as chalcopyrite. In 1782, Bivongi was one of the silver districts in Calabria Ultra, along with Stilo, Badolato, Longobucco, and Reggio Calabria, with mines like Raspa, Argentera, Costa della Quercia, and Due Fiumare (Cunsolo, L., 1965). In 1893, Beccarla discovered minerals in this area. The Torelli and Re company began searching for molybdenite in 1917, followed by Breda in 1939. They opened about 60 mines in Bivongi, Stilo, Placanica, Guardavalle, Caulonia, and Nardodipace, such as Giolli, Punghi, Franco, Bagni, Acqua Calda, Piave, and Regina. During World War II, operations were suspended, and Breda unsuccessfully attempted to resume them. In 1948, the Silani Studies Center evaluated the possibility of resuming mining, and in 1951, La Mineraria Calabra was established, but it also failed (Franco, D., 2003). Among the mines of Bivongi are Cava, Frana, Garibaldi, Gattaraghi, Giamba, Giolli, and Paoli.

Conclusions

The Stilaro Valley in Calabria has represented a center of mining and metalworking of great historical and economic importance. The mines of Stilo, Pazzano, and Bivongi, along with other extraction activities along the belt between Aspromonte and Serre Calabre, have played a crucial role in the development of the region.

Mining and metallurgical activities attracted ancient populations that settled in the area, contributing to the formation of a local culture and economy based on the mining industry. The iron, silver (and gold?) resources in the valley fueled a flourishing production of artifacts and tools, supporting economic activity and trade in various contexts.

Although many mines have been abandoned over the centuries, the historical and cultural heritage linked to these activities remains a fundamental

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element in the identity of the local community. The conservation and study of this heritage are crucial for understanding the economic and social history of the region and for preserving the memory of the traditions and activities that have shaped the social and industrial fabric of this part of Southern Italy.

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Fiumara d'Assi flows into the Ionian Sea, in the territory of the municipality of Monasterace. In ancient times, it was called Argentero and, until the 16th century, it acquired the appellation of the "river of silver" due to the silver mines in the area. The stream, 56.77 km long, has a drainage basin of 66.50 km² and its source is at an altitude of approximately 1,410 meters above sea level on the massif of Monte Pecoraro. Among its tributaries are Mulinelle, Vallone Ficara, Vallone del Cicuti, Torrente Mula, and Fosso Storto. Its course culminates in the mouth that opens into the Ionian Sea at coordinates 38°27′21″N 16°58′29″E. The origin of the name "Assi" could derive from the Greek, indicating the meaning of "Holy", or from Latin, referring to "Axle of the wheel". Kaulon, the ancient Greek city, was active in the extraction and trade of minerals in the area of the Fiumara d'Assi. Literary sources attest to the presence of an ancient port at its mouth. In the vicinity of Punta Stilo stood the medieval settlement of Stilida, a testament to intensive mining activity in the Assi basin during the Middle Ages and the modern era. In the adjacent area were the locations of Argentina and Ferrera, dedicated to the refining of iron and the production of pipes for the aqueduct of the royal palace of Caserta. In 1959, along a winding tributary of the Assi, a gutter channel was installed, locally known as "acquaru e Bulici", to enhance the electrical energy supplied by the Marmarico hydroelectric plant on the Stilaro. At the time, the construction of an additional dam along the Mula tributary was also planned. The lower valley of the Assi is characterized by gullies, while upstream is the Mulinelle stream, a significant tributary of the stream. Today, the Fiumara d'Assi offers opportunities for hiking activities in spring and summer. Marked trails allow you to walk up the stream to the Pietracupa waterfall, as well as to hike back along the Mulinelle tributary. Another hiking trail, starting from the locality of Santo Stefano, leads back to the Pietracupa Waterfall.

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Local Practices in Sacred Groves Management in Togo: A Comparative Study in *Nawda*, *Ifè*, and *Ouatchi* Lands

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Abstract

Local populations have ensured the sustainable management of forest resources by sanctifying areas of woodland. Despite the reduction of these sacred groves by multiple threats, including those caused by humans, they

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persist and demonstrate the community's desire for preservation. This paper focuses on increasing the comprehension of the management of local sacred groves within the *Nawda*, *Ifè*, and *Ouatchi* regions in Togo. Qualitative ethnographic analysis was employed to describe how the management practices are carried out and also to examine their underlying socio-cultural concepts. The findings of the study indicate that customary religious, family, and political authorities manage sacred groves. Management practices involve conducting ritual ceremonies and establishing rules and regulations. The socio-cultural representations that shape these management practices facilitate the definition of sacred groves as sites of shared memory, confer upon them the status of dwelling places of protective divine beings/ancestors, and identify them as sources of prosperity and abundance.

Keywords: Sacred groves, Local management practices, Ritual ceremonies, Prohibitions, Socio-cultural representations

Introduction

It is now recognized that modern nature protection policies, based on scientific knowledge, have shown their limitations in failing to ensure the sustainable conservation of ecosystems. This failure has led to a growing interest in local naturalist knowledge and related practices (Cormier-Salem & Roussel, 2014; Ibo, 2005). This knowledge, developed by local communities based on their relationship with the environment and their experience of living things (Dumez et al., 2014; UNESCO, 2017), has long been ignored and scorned by the world of science and, more generally, by the world of development. However, since the 1990s, the Convention on Biological Diversity has recognized the importance of the knowledge, innovations, and practices of local and indigenous communities for the conservation and sustainable use of biological diversity. As a result, more and more scientists, including naturalists, ecologists and agronomists, are looking to these communities as a source of new and accurate information about environments and biodiversity, while developers and planners are seeking effective solutions in terms of prudent management and sustainable use of resources (Cormier-Salem & Roussel, 2014). In this way, knowledge relating to the culture of people, which has long been sidelined and regarded as negative (Wala et al., 2003), is now being called upon to supplement or compensate for the shortcomings of so-called scientific knowledge.

Among the local methods of environmental management and biodiversity conservation rooted in local naturalist knowledge are the sacred groves recognized by the Convention on Biological Diversity as veritable sanctuaries of plant and animal biodiversity (Ibo, 2005). Sacred groves are often located close to villages and usually cover relatively small areas (Juhé-

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Beaulaton, 2013). Their creation, sacralization, and elevation to the status of an institution feared and respected by local communities have helped to protect many plant and animal species from exploitation (Savadogo et al., 2011). In this work, sacred groves are defined as:

> "small patches or islands of remaining original habitat or forests of various dimensions partially or fully protected by local religious and/or cultural actors. They are maintained through complex traditional institutions that sometimes do not require governmental involvement " (Nganso et al., 2012, p.1)

In Togo, the sustainable management of natural resources has long been the responsibility of the local populations, thanks to their know-how, which includes the sacredness of the forests (Wala et al., 2003). Throughout the different cultural areas of Togo, there is a diversity of sacred groves. They have a strong link with religion and the taboos that form the cornerstone of natural resource management in Africa (Sibanda, 1999). They contribute to the well-being of the local population through their various functions. These include religious, socio-cultural, and nutritional functions. Not only do sacred groves shelter deities and the spirits of ancestors, and serve as sites for certain rites and initiations, they also constitute a reserve of food and medicinal plants, and sometimes contain springs where local people come to get water (Kokou et al., 2005).

Furthermore, in the face of the reduction in their surface area caused by multiple threats, the sacred groves are resisting complete disappearance, bearing witness to a desire for preservation on the part of the local populations, and it is this desire that continues to halt their complete disappearance (Kokou et al., 2005). This desire demonstrates a real attachment to these groves and their importance in the eyes of these populations, as can be seen in the villages bordering the sacred groves in the *Ouatchi*, *Ifè*, and *Nawda* areas.

The system of sacred grove management instituted by local communities has proved effective, even if it has its limitations. Through well-defined practices, it has been able for generations to prevent these areas from disappearing. Proof of this is the longevity of these forest islands, which have survived the passage of time, some dating as far back as the 13th century, such as the *Akissa* sacred grove in south-east of Togo (GIZ, 2016). Given these facts, it is legitimate to ask the following question: what are the socio-cultural management practices of sacred groves in Togo?

The management of these forest fragments is based on local beliefs that carry with them a whole system of representations that it is becoming necessary to take interest in. Thus, this is because they are disappearing as the sacred groves shrink. Given that these representations are strongly linked to the very existence of sacred natural sites, it is important to know and

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understand them. Hence the question, what are the representations that come into play in the management of sacred groves?

To provide answers to the questions raised above, the general aim of this article is to contribute to a better understanding of local sacred grove management practices in the *Ouatchi*, *Ifè,* and *Nawda* areas in Togo. Specifically, the aim is to (i) analyze local sacred groves management practices in the above areas and (ii) study the socio-cultural representations on which these practices are based.

Methodology

Study Area

The study was conducted in three cultural areas of Togo. These are the *Ajatado* or *Adja-Ewe*, the *Kabyè-Tem*, and the *Ifè* area. Specifically, the ethnic groups concerned are the *Ouatchi* sub-group (*Adja-Ewe* area), the *Nawdeba* (*Kabyè-Tem* area), and the *Ifè* (*Ifè* area) (Figure 1).

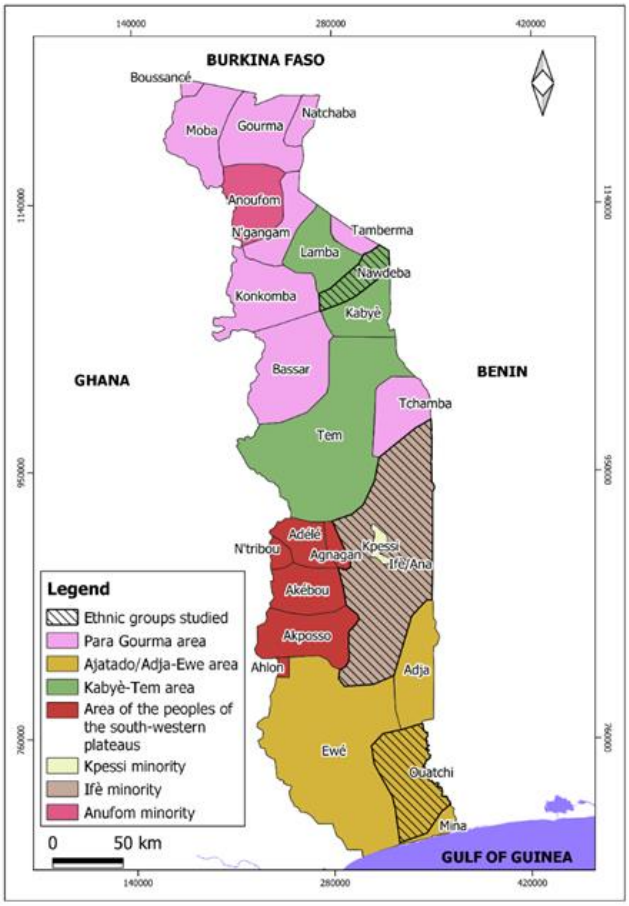

Figure 1. Location of ethnic groups and cultural areas in the study (adapted from Gayibor (1997))

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This paper focuses on three sacred groves found on the territories of the three aforementioned ethnic groups. These are:

- The *Godjè-godjin* sacred grove (53 ha) located in the prefecture of *Yoto* (Figure 2), precisely in the cantons of *Gboto* and *Essè Godjin*[1] in *Ouatchi* area in south-east Togo (Kossi-Titrikou et al., 2021);
- The sacred *Igbolakou* grove of *Okpodjivè* (10 ha) in the *Ogou* prefecture (Figure 2), canton of *Datcha*, *Ifè* area in south-central Togo;
- The *Niamtouragou* sacred grove (7 ha) in the prefecture of *Doufelgou* (Figure 2), canton of *Niamtougou*, *Nawda* area in north-east Togo.

The choice of these ethnic groups and sacred groves was motivated by the need to compare local management methods for sacred groves in ethnic groups belonging to different cultural areas. In addition, the ethnic groups selected are among those with the largest number of sacred groves in proportion to the surface area of their territory (Hounkpati, 2020).

The research was carried out in the following *Ouatchi* localities: *Godjinmé*, *Gboto-zeve*, *Gboto-Kossidamé*, *Gboto-Zogbe*, *Témanou-Copé*, and *Domeze-Copé*. These villages were chosen not only because they border the *Godjè-godjin* sacred grove, but also because they all claim it as their own. In the *Ifè* area, only the village of *Okpodijivè* was included in the data collection because it contains the sacred grove chosen for the study. Among the *Nawdeba*, the town of *Niamtougou* was chosen for an investigation into the *Niamtouragou* sacred grove.

[1] It is home to the Krobo ethnic minority, now assimilated into the Ewé (Ouatchi) groups (Kossi-Titrikou et al., 2021).

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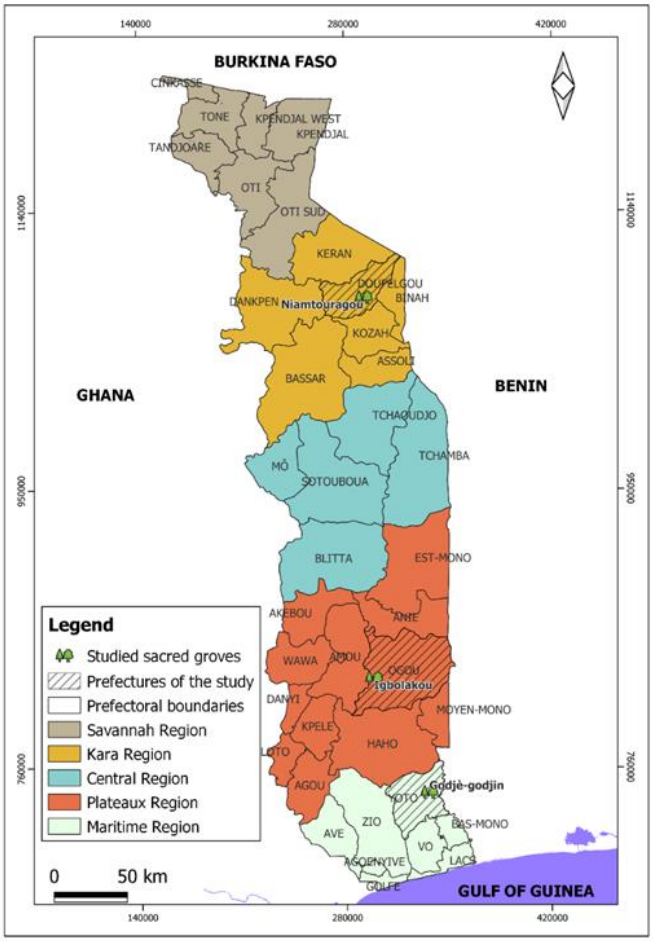

Figure 2. Administrative location of the sacred groves in the study

Methodological Approach

Nature of the Research

For this research, a qualitative approach was adopted to identify sacred grove management measures in the three study areas. The aim is to identify these practices and representations and to analyze them to understand how the local authorities, who are the guarantors of these practices, achieve their conservation objectives. In addition, this paper focuses on using a comparative approach to analyze the points of convergence and divergence in sacred grove management practices in Togo.

Data Collection

- **Literature Search**

It focused on themes relating to the management of sacred groves, in particular the importance of sacred groves, socio-cultural management norms

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and practices, and the socio-cultural representations involved in this management. To this end, several types of documents dealing with sacred groves were consulted, including scientific works, journal articles, study reports, dissertations, etc. from both the social sciences and the environmental sciences.

- **Ethnographic Surveys**

The initial field researches were carried out between August and November 2020. Subsequently, additional surveys were carried out during short visits between February and March 2023 to update and supplement the data previously collected. In the three research areas, a total of 110 people[2] were interviewed within the target populations, i.e., the communities living around the sacred groves. Informants were selected from the target population according to the principle of internal diversification (Pires, 1997). In addition, resource people were interviewed, including village and canton chiefs, *Vodou* priests and priestesses, people in charge of places of worship and custodians of sacred objects, forestry officials, and families with rights to the sacred groves. Several techniques were used to collect the data. These are direct observation, group and individual interviews.

Observation was carried out from the inside, allowing us to immerse ourselves in the life of the communities studied and to gain gradual access to local sacred grove management practices. The observation was based on a grid that included observation situations such as the activities carried out around the sacred groves, the types of people frequent in the forest, and the times of day when people could access it.

Two types of interviews were conducted during the research. Firstly, group interviews were organized with local people, each time bringing together 7 to 10 people with whom discussions were held on the purpose and importance of sacred groves, management measures, and representations linked to the sacred places. The subjects discussed in the groups were later discussed in greater depth with the informants and resource people.

Group and individual interviews were conducted using a discussion outline and interview guide drawn up beforehand. At the end of data collection, 26 individual interviews and 2 group interviews were carried out for the *Godjè-godjin* sacred grove, 19 individual interviews and 1 group interview for the *Okpodjivè* sacred grove, and 17 individual interviews and 2 group interviews for the *Niamtouragou* sacred grove.

[2] 62 people were interviewed individually and 48 in groups.

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Data Processing and Analysis

The data from the observations was combined with the transcribed interview data to form a corpus for analysis. This corpus was processed using Nvivo 12 Plus software, which enabled a content analysis to be carried out using a pre-designed grid. The themes identified are set out in Table 1 below:

Table 1. Themes for analysis

Themes	Dimensions
Governance of sacred groves	Management of sacred groves Sacred groves management authorities
Socio-cultural management practices in sacred groves	Endogenous conservation measures for sacred groves Religious beliefs and practices associated with sacred groves
Socio-cultural representations (SR) of groves	SR linked to the collective history of populations SR linked to the community identity of societies SR linked to the divinities SR linked to ecosystem provisioning and regulating services

Results

Sacred Groves Management Practices of the Ouatchi, Ifè, and Nawdeba Peoples

The sacred groves studied in this work are woodlands dedicated to divinities and ancestors. Their management is based on a diversity of practices rooted in a religious universe and a style of thought specific to each ethnic group. These practices include ritual ceremonies and prohibitions decreed and controlled by the bodies responsible for managing the sacred groves.

Entities in Charge of Sacred Grove Governance

The governance of sacred groves in the *Ouatchi*, *Ifè*, and *Nawda* areas is characterized by a system at the center of which are the political authority, the religious authority, and the clans that hold decision-making power at the customary level. The political authority is represented by the village chief, while the religious authority is symbolized by one or more traditional priests responsible for managing the sacred groves. The holding clans are the descendants of the mythical ancestor who founded the village or was the first to occupy the grove. Among the *Ifè* and the *Nawdeba*, the groves belong to the community, but decision-making power rests with specific clans. Sometimes, the three types of authority mentioned above are represented by the same people. This is the case in *Okpodjivè*, where the sacred grove is under the authority of the village chief and priests, all of whom come from the clan that holds the rights to the grove. In addition to having a similar system of governance based on customary and religious norms, the *Godjè-godjin* sacred grove has a management committee and a supervisory board made up of the Prefect, the canton chiefs, the village chiefs, and the forestry administration.

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This grove is therefore unique in that it is managed on a mixed basis, with governance involving diverse stakeholders. In 2017, it received funding to draw up a management plan and a local convention that sets out the laws and management measures.

Ritual Ceremonies

Sacred groves share objectives common to all three study areas. They are at the same time a sanctuary for the deities, a shelter for the spirits of the ancestors, and a site for ritual ceremonies. *Godjè-godjin* is a sacred grove that shelters the spirits of the ancestors and the three main deities: *Bagbo, Godjè,* and *Tchawè*. The sacred *Igbolakou* grove is home to the spirits of the ancestors and a sanctuary called *Akpolori,* which houses the eponymous deity as well as other deities like *Tchankpana* and *Heviesso*. The sacred *Niamtouragou* grove is a sanctuary for the spirits of deified ancestors and a place for initiation rites. Its periphery also serves as a cemetery for those who have been initiated there.

Several ritual ceremonies are organized in the villages surrounding the *Godjè-godjin* sacred grove (*Gboto-Zogbé*, *Domézécopé*, *Essè-Godjin*). These ceremonies include *Peta tɔtrɔ*, which is a priority for both the *Ouatchi*, owners of the *Godjè* and *Tchawè* deities, and the *Krobo*, owners of *Bagbo*. It takes place inside the sacred forest and its frequency varies according to the deities. For Godjè and Tchawè, the ceremony is held between March and May every three years, whereas for *Bagbo,* it is held annually. These are rites during which propitiatory sacrifices are made to the deities residing in the forest to implore their blessing for the well-being of the community and abundant harvests. The sacrifices consist of the immolation of goats and chickens, the meat of which is eaten in the sacred forest. These ritual ceremonies are part of a series of traditional festivals that bring together most of the villagers, especially those who identify with this cult.

Among the *Ifè* of *Okpodjivè,* the sacred *Igbolakou* grove is also the focus of annual ritual ceremonies known as *Odjououlou,* which means "the eye of the village". This rite takes place at the beginning of January and commemorates the history of the creation of the village. The ancestor who founded the village had to obtain permission from the spirits of the grove before setting up camp. To do so, he had to make offerings to them and sacrifice a person who would bring them the gifts. The ancestor's uterine nephew was chosen, but he survived the ordeal and emerged unharmed from the grove. To commemorate this event and thank the spirits for sparing the 'hero's' life, the *Odjououlou* ceremony is held every year. The rituals consist of sacrificing a billy goat or ox, and drinking offerings. They take place in the evening inside the sacred grove. The meat of the sacrificed animals is eaten on the spot, and is strictly forbidden to be brought back to the village. The purpose

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of these ceremonies is also to seek the favor of the ancestors for regular rainfall and good harvests.

In *Niamtougou*, the sacred grove plays a central role in the belief system and the regulation of social life. It is the sanctuary of the ancestors, who are consulted there by the *Santba* initiates in charge of making the libations and sacrifices needed to ward off the bad luck that befalls the community. The sacred grove contains relics of dwellings and objects which, in the belief system, constitute the place where the mythical ancestor lived. As such, it has an identity function for the communities. The *Santba* authorized to conduct ritual ceremonies in the sacred grove which are initiated during the *Santberm*. This is an initiation rite organized every 5 years, the aim of which is to train a caste of initiates responsible for intervening with the ancestors to resolve the community's problems, whether economic, social or health-related. The rite consists of a series of initiation rituals followed by the initiates. These rituals take place over several days in the village with the humans and then in the sacred grove in the company of the spirits of the ancestors, where a large part of the esoteric knowledge is passed on to the initiates. It is important to specify that initiates are of both sexes. However, women authorized to become initiates must be over 45, as they are mature and menopausal at this age.

Definition of Rules and Prohibitions

To regulate access to and the collection of resources from sacred groves, each society defines norms and prohibitions and ensures that they are applied. In the villages bordering the sacred grove of *Godjè-godjin*, wood cutting, hunting, and fishing are forbidden. It is also forbidden to approach the convents in the grove wearing clothes and shoes. Failure to comply with these prohibitions exposes the offender to fines proportionate to the type and seriousness of the offence. Offenders are also liable to the wrath of the divinities, which manifests itself in a series of misfortunes that can even lead to death. The fear aroused by the deities present in the sacred grove is also a factor in compliance with the rules and prohibitions. Women are forbidden access to the grove if they are considered impure. This impurity is linked to menstruation and sexual acts.

In *Okpodjivè*, the prohibitions concerning the sacred grove are similar to those mentioned for *Godjè-godjin*. In addition, it is not permitted to walk around the sacred grove. Cutting wood, hunting, and shooting with firearms are strictly forbidden. Similarly, the gathering of dead wood is not permitted, as it is used as fuel for cooking sacrificial food during annual rituals in the grove. Here, women are doubly forbidden. They may only enter the grove during ritual ceremonies and must stay away from the *Akpolori* sanctuary when they are impure. If the rules and prohibitions are broken, a fine is set according to the offence committed. The fine is often set after consultation

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with the divinities, who tell the diviner-priest what is needed to ensure that the harm caused is made good. Most of the time, this involves liquor, beer, palm oil and animals, intended to appease the gods. According to the traditional priest who guards the sacred grove, any undiscovered violation is signaled by the deities through special signs. These signs are interpreted by the diviner, who concludes that the violation has occurred and identifies the culprit.

The rules and prohibitions governing the management of sacred groves are not very different among the *Nawdeba* either. Here, they are mainly linked to the times of access to the sacred grove, the person entering it, and the activity they intend to carry out there. For example, it is forbidden to enter the sacred grove in the early evening (from 4 pm) and at night. This prohibition is justified by the fact that these hours correspond to the times of activity of the spirits that reside there. Consequently, going into the sacred grove at these times is synonymous with disturbing the peace of the ancestors. Women are forbidden access except during ritual ceremonies, as is the case with the *Ifè* of *Okpodjivè*. The same prohibition applies to children, and more strictly to outsiders. Collecting firewood and hunting are also forbidden activities in the sacred grove, but an exemption is granted for collecting medicinal plants. As one informant put it: "*Certain activities in the groves are accepted with the authorization of the customary leaders. It is permitted to collect medicinal plants, but only with the authorization of the customary chief*" (Extract from an interview in Niamtougou, September 2020).

The system of rules and prohibitions presented here have always been part of the history of sacred groves. These rules and prohibitions have deep religious roots and have been respected throughout the ages. However, these days, there is a laxity in respecting the rules of conduct laid down for the management of sacred groves. In the case of the three sacred groves studied, this relaxation is effective. It can be explained by a social and religious dynamic that manifests itself in the abandonment of local beliefs in favor of new forms of religiosity.

Socio-cultural Representations at Stake in the Traditional Management of Sacred Groves

Sacred Grove as a Place of Collective Memory

In all the communities we visited, the sacred groves represent a place of collective memory. They are an integral part of the history of the peoples, with a special place in the founding myths. An analysis of the legends relating to the creation of the *Ouatchi* villages bordering the sacred grove (*Gboto-zeve, Gboto-Kossidamé, Gboto-Zogbe, Témanou-Copé, Domeze-Copé*) reveals a common thread. These stories feature a founding ancestor who came from Kouvé, a village around ten kilometers away, to settle in the *Godjè-godjin* grove with his family. The place where he settled is the original site from

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which the various villages were created. In the same vein, the *Krobo* attribute the discovery of the *Godjè-godjin* grove to their ancestors, who settled there at the end of their exodus from Ghana.

The same is true of the *Ifè* of *Okpodjivè* and the *Nawdeba* of *Niamtougou*. The former attribute the discovery of today's *Okpodjivè* grove to the founding ancestor who came from the village of Ariafe near the Benin border. He set up camp next to the grove after agreeing to sacrifice his uterine nephew to the local spirits. It was this camp that became the village of *Okpodjivè*. For the *Nawdeba* of *Niamtougou*, the sacred *Niamtouragou* grove is the mythical site where the founding ancestor of the locality and his family appeared and lived. It cannot be dissociated from the origins of the people of *Niamtougou*.

These accounts demonstrate the attachment of the local people to their sacred grove, the disappearance of which would mean the loss of a part of their history. The value of these groves in terms of identity is clear. This is why the chief of the village of *Godjinmé* says: "*The sacred grove is our life, it's a symbol of our cultural identity*" (interview extract, February 2023).

Sacred Grove as the Home of Protective Deities/Ancestors

In the three ethnic groups studied, the grove in general is conceived as a space separate from that of humans and inhabited by divinities and protective ancestors. A closer look at the sacred groves reveals that their sacred nature is explained by the presence of sanctuaries dedicated either to the *Vodu* deities in the *Ouatchi* and *Ifè* areas, or to the ancestors among the *Nawdeba*. For example, as already mentioned, the *Igbolakou* and *Godjè-godjin* groves are home to convents dedicated to deities such as *Akpolori*, *Tchankpana*, and *Hebiesso* for the former, and *Bagbo*, *Godjè,* and *Tchawè* for the latter. In *Nawda* area, as far as the *Niamtouragou* grove is concerned, the deified ancestors are the “occupants” and form an integral part of society, given the central role they play.

The conception of the grove as a world of spirits, and also as the home of deities and ancestors, inspires fear and respect within the community. Moreover, the groves, because they provide shelter for these entities, are also thought of as a source of mystical power. Thus, the power to ward off bad luck or to deal with misfortune that strikes the community is said to be consubstantial with the grove and the entities that inhabit it. With this in mind, the customary leader of the *Niamtouragou* grove explains:

> *"In this sacred grove lies all the strength of the people and the canton of Niamtougou. It is the source of our creation. Our life is here. It is from this grove that our elders derive their power. This is where the first man of our community was born*" (Extract from an interview in *Niamtougou*, September 2020).

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An analysis of this verbatim allows us link the socio-cultural representation presented here and that set out above. Like sacred groves, deities and ancestors are also an integral part of community history. As a result, these entities cannot be dissociated from either the sacred groves or the history of the Ouacthi and *Krobo* communities of the villages bordering *Godjè-godjin*, the *Ifè* of *Okpodjivè,* and the *Nawdeba* of Niamtougou. As a result, the divinities and ancestors share the same identity value with the sacred groves they "inhabit".

Sacred Grove as a Source of Well-Being and Wealth

Sacred groves are also seen as a source of well-being and wealth. The well-being and wealth in question here are linked above all to the ecosystem services of provisioning and regulation they provide. Whether in the *Ouatchi*, *Ifè* or *Nawda* areas, the populations we met indicated the existence in their sacred groves of plants whose organs are used as food and medicine. Although hunting and logging are prohibited, the harvesting of plants is regulated in all three communities. The plants include *Khaya senegalensis* used to treat malaria and fever, *Triplochiton scleroxylon* used to treat eye ailments, *Dialium guineense* used to cure infections and whose fruit is edible, and *Ceiba pentandra* used as food. In addition to medicinal and food plants, sacred groves may also contain watering places used by local people. In the *Godjè-godjin* grove, for example, there is a water source that local people use in times of drought.

In terms of regulating services, local people link the coolness of the microclimate and the regularity of rainfall to the presence of the sacred groves. They therefore recognize their positive impact on agricultural activities in particular.

As well as being a source of well-being in terms of the ecosystem services they provide, sacred groves are also a cultural asset, attracting development projects that help to improve living conditions for local people. For example, the *Godjè-godjin* grove is the one that has attracted the most funding, notably through the Mono Delta Transboundary Biosphere Reserve project and the West African Coastal Area Management Programme (WACA). A local authority from the village of *Témanoucopé* said: "*The grove is a treasure for us. Thanks to it, the WACA project has donated 27 million CFA francs to build solar panels in the villages bordering the grove [...] The grove is therefore a great source of wealth and an asset for us local people"* (Interview extract, February 2023).

Discussion

Sacred groves are cultural and religious institutions in many African societies. They belong to a category of sites or spaces that are genuinely

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sacred. This sacred nature is based above all on a symbolic organization of man's relationship with the world (Dugast quoted in Ballarin & Blanchy, 2016). There are several types of groves, including cemetery groves, groves of gods or genies, groves of secret societies and groves of ancestors, and venerated animals (Kokou & Sokpon, 2006; Savadogo et al., 2011). This paper focuses on the groves of divinities/ancestors in the *Ouatchi*, *Ifè*, and *Nawda* areas to analyze the management practices and representations that underpin them. The results indicate that, in terms of governance, sacred groves are managed by local management entities with customary, and politico-religious authority. These management entities are made up of a category of people that Savadogo et al. (2011) and Dounias (2015) have also identified as customary authorities, guardians of divinities, notables, and other resource persons made up of older people.

In terms of management, the study showed the adoption of practices involving the use of sacred groves as sites for ritual ceremonies on the one hand, and the establishment of rules and prohibitions on the other. Similar practices to those highlighted in this work have been revealed by several authors. Ballarin and Blanchy (2016) describe sacred groves as settings for male initiation rituals and cyclical rituals that regulate the community. This is the case for the *Nawda* people in Togo. In this area, each village has a sacred grove (Wala et al., 2003) which plays a major role in the *Kowt* and *Santberm* initiation rites studied by (Sama, 2020). In the neighbouring *Kabye* area, the sacred groves, despite their relatively small size, are essential for ritual ceremonies. They are points of intersection between natural forces and the land places where the divine powers called "*Egolmyè"* manifest themselves (Daugey, 2016).

As far as prohibitions are concerned, Cormier-Salem and Roussel (2014) note a system of prohibitions in which hunting is generally prohibited, while other less aggressive activities such as collecting dead wood and gathering food and medicinal plants are strictly controlled. According to Houngnihin (2005), the sacralization of groves is an endogenous technique for conserving natural resources and protecting nature by turning them into botanical and ecological gardens, where the removal of plant species for medicinal and ritual purposes and the collection of dead wood is subject to authorization. Everyone is required to respect community prohibitions linked to sacred groves. Violation of these prohibitions carries penalties that vary according to the seriousness of the offence. In the same vein, Savadogo et al. (2010, 2011) describe an endogenous management system for the natural resources of the sacred groves of the Mossi people of Burkina Faso, based on customary principles, rules and laws: no cutting of wood, no fires, no hunting, and no use of the grove outside days of worship. However, people's compliance with these principles and rules is declining, as this study has

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shown. This result is in line with the observations made in Togo by Kokou et al. (2005) for the sacred groves of the *Ouatchi* area in the maritime region, Takou et al. (2010) for the sacred groves of the *Ogou* prefecture (Plateaux region), and Lynch et al. (2018) in the sacred groves of Kaboli (Tchamba Prefecture, Central Region). In addition to the abandonment of local beliefs, these authors blame the ever-increasing demand for arable land, urbanization, and population growth for the risk of disappearance facing sacred groves.

Sacred grove management practices involve several socio-cultural representations. The role of these representations is to legitimize the actions taken (Jodelet, 2003) as part of the customary governance of sacred groves. Three main representations emerged from this study. These identified the sacred grove as a place of collective memory, a home for protective deities/ancestors, and a source of well-being and wealth. An analysis of the literature on sacred groves reveals socio-cultural representations that converge in the same direction. Firstly, groves are conceived as the lair of spirits and the support of collective mythical representations (Bertrand, 1992). Secondly, for many African ethnic groups, they are the domain of the founding ancestors (Pellissier, 1980) and the founding sites of human settlements, which generally house the protective divinities of the villages and also serve as cemeteries (Juhé-Beaulaton, 2013). As a result, they constitute an important place for the identity of local populations (Ibo, 1998). They are places of communion, transmission of collective memory and recognition (Juhé-Beaulaton & Roussel, 2002). In the same vein, Badiane and Coly (2009) attribute to the sacred grove, the function of ensuring the continuity of rites and contributing to social stability as a place for the transmission of knowledge, as in the case of *Santberm* among the *Nawdeba*. Finally, sacred groves are seen as a shared cultural and natural heritage. In the eyes of not only the population in general, but also of the followers of the *Vodu* cult, they constitute a food reservoir, medicinal and liturgical plants (Hamberger, 2006; Kokou et al., 2005).

In view of the main findings, this paper is a contribution to a better understanding of the cultural mechanisms put in place by local people for the management of sacred groves, and also a demonstration of their interest in safeguarding them. Today, in the context of the fight against climate change and the preservation of biodiversity, it is essential to consider sacred groves and the mechanisms governing their management. This is why traditional practices have been taken into account in Togo's national biodiversity strategy and action plan (SPANB 2011-2020) through national biodiversity target no. 18[3] , as well as the restoration of sacred groves in Togo's National Reforestation Programme 2017-2030.

[3] Objective 18. Increase national expertise by 2020, including consideration of traditional practices

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Conclusion

Sacred groves in *Ouatchi*, *Ifè,* and *Nawda* areas are managed by customary religious, family or political authorities according to local practices rooted in local belief systems. These practices consist of ritual ceremonies in which the sacred groves serve essentially as sites. In the sacred grove of *Godjè-godjin*, ritual ceremonies are dedicated to the protective deities *Bagbo*, *Godjè* and *Tchawè* to implore their protection and blessing. To commemorate their shared history, the *Ifè* of *Okpodjivè* hold an annual *Odjououlou* rite in the sacred grove of *Igbolakou*. Among the *Nawdeba* of Niamtougou, the *Santberm* initiation rite, and the many occasional prayers to the ancestors give the *Niamtouragou* grove a predominant place. In all three communities, similar rules and prohibitions have been established to regulate access to and collection of resources within the sacred groves. It is forbidden to collect natural resources unless special authorization is granted. Customary management of sacred groves is part of a vision of the world in which socio-cultural representations are developed to guide management practices. These representations have been identified and there are three types: those that enable sacred groves to be defined as a place of collective memory, those that attribute to them the status of abode of protective divinities/ancestors, and those that identify them as a source of well-being and wealth. The first type of representation refers to the identity dimension of sacred groves, which are at the heart of the history of the creation of the villages that host them. The second type of representation makes the link with the sanctuarization of sacred groves, which house the convents of divinities and ancestors. The last type of representation is based above all on the ecosystem services of supply and regulation that the sacred groves provide to the populations.

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Data Availability: All data are included in the content of the paper.

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Cherté De Main-D'œuvre Agricole Et Stratégies D'Adaptation Des Paysans Dans La Commune De Zè

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Résumé

L'agriculture contribue au processus de développement économique et social de la commune de Zè. Aujourd'hui, la production agricole est confrontée à la problématique de la main-d'œuvre dans cette localité. La présente recherche vise à étudier la pénurie de la main-d'œuvre et les stratégies d'adaptation dans la commune de Zè. La méthodologie adoptée dans le cadre de cette recherche s'articule autour de la collecte des données, du traitement des données et de l'analyse des résultats. La recherche documentaire et les enquêtes de terrain ont été les techniques de collecte des données. Les outils utilisés pour cela sont un questionnaire, un guide d'entretien et une grille d'observation. 160 personnes ont été enquêtées. Les résultats révèlent que dans la commune de Zè, les producteurs utilisent plusieurs types de main-d'œuvre. La main-d'œuvre familiale représente 70 %. Les producteurs ont recours aussi à la

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main-d'œuvre extérieure sous différentes formes pour les travaux agricoles. Ce type de main-d'œuvre représente de 30 %. Deux formes de recours à la main-d'œuvre extérieure se distinguent : l'entraide avec 5 % et le salariat avec 25 %. Dans la commune, selon 70 % des producteurs enquêtés, il y a l'insuffisance de la main-d'œuvre familiale, la rareté de la main-d'œuvre salariée surtout en période des travaux agricoles. Cette situation entraine le retard dans l'exécution des différentes opérations culturales (défrichage, labour, semis, sarclage, récolte). Les producteurs agricoles développent plusieurs stratégies d'adaptation à cette pénurie de main-d'œuvre.

Mots-clés: Zè ; main-d'œuvre ; producteurs ; cherté

Agricultural Labor Shortage and Farmers' Coping Strategies in Zè Commune

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Abstract

Agriculture contributes to the economic and social development of the commune of Zè. Today, agricultural production is confronted with the problem of labor in this locality. The aim of this research is to study the labor shortage and coping strategies in the commune of Zè. The methodology adopted for this research revolves around data collection, data processing and results analysis. Documentary research and field surveys were the techniques used to collect data. The tools used were a questionnaire, an interview guide and an observation grid. 160 people were surveyed. The results show that in the commune of Zè, growers use several types of labor. Family labor accounts for 70%. Producers also use outside labor in various forms for farm work. This type of labor accounts for 30%. Two types of outside labor stand out: mutual

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aid (5%) and salaried work (25%). In the commune, according to 70% of producers surveyed, there is a shortage of family labor and a scarcity of hired labor, especially during the farming season. This situation leads to delays in the execution of various cultivation operations (clearing, ploughing, sowing, weeding, harvesting). Farmers have developed several strategies to adapt to this labor shortage.

Keywords: Zè; labor; producers; high cost

Introduction

Le secteur agricole constitue pour les pays en développement la principale activité économique des populations. Par la pratique de l'activité agricole, les besoins fondamentaux des populations sont satisfaits. Il demeure l'élément fondamental de toutes les politiques stratégiques de la sécurité alimentaire et de réduction de la pauvreté (Agalati B., et *al*., 2018). En Afrique, le secteur agricole emploie 60 % des ménages agricoles, contribue pour 35 % à la formation du Produit Intérieur Brut (PIB) contre 40 % pour les Pays les Moins Avancés (Midingoyi G. S.-K, 2008). Tout le processus cultural à savoir l'emblavure des superficies, le semis, le sarclage, la récolte et le stockage (Gnimadi C.C., 2012) est fonction de la disponibilité de la main-d'œuvre agricole (Faliou I. O. et *al*., 2020). Ainsi, la main-d'œuvre agricole demeure l'un des facteurs déterminants du système agricole (Larson, et Gurara, 2013 ; Marenya et Barrett, 2007). La cherté de ce facteur, limite les emblavures, accroît les coûts de production, et impacte négativement le calendrier cultural (Houndékon 1986 ; Kpenavoun, 2000 ; Khanal et *al*., 2015 ; Khanal 2018). La main-d'œuvre agricole apparaît comme l'une des contraintes au développement du secteur agricole en plus des aléas climatiques (Maharjan, et *al*, 2013 ; Sim et *al*., 2016 ; Paudel et *al*., 2020), cité par (Saliou I. O. 2020). Selon Clarke et Bishop (2002), cité par Agalati B. et *al*., (2018), la force humaine est utilisée pour 65 % des emblavures contre 25 % pour la traction animale et 10 % pour la motorisation en Afrique Sub-Saharienne. Selon les mêmes auteurs, les hommes sont utilisés dans les proportions des 2/3 des superficies emblavées et cultivées avec des outils rudimentaires entrainant des écarts importants.

Au Bénin, la cherté de la main-d'œuvre agricole s'accentue et s'exprime par les difficultés de mobilisation des bras valides pour la réalisation des opérations culturales. Cette situation s'explique par les tendances haussières des salaires des ouvriers agricoles (Martin, 2007), cité par (Saliou I. O. et *al*., 2020). Pourtant, les ouvriers agricoles sont utilisés pour les emblavures dans les proportions de 76 % pour les cultures manuelles contre 23 % pour les cultures motorisées (Tchougourou et Alexandre, 2004), cité par (Agalati B. et *al*., 2018). Face à cette difficulté de pénurie de main-d'œuvre

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agricole, les producteurs adoptent plusieurs stratégies pour la réalisation des différentes opérations culturales dans le milieu d'étude. Le caractère manuel de cette activité économique contraint les ménages agricoles à une agriculture de type familial. Toutefois, cette agriculture apporte une contribution substantielle à la croissance économique avec une moyenne de 2,4 % sur la période de 2011 à 2015 (MAEP, 2017, cité par (Agalati B. et *al*., 2018). Malgré cette faible contribution à la croissance économique du pays, le développement de l'agriculture produit des effets d'entrainement sur les secteurs secondaires et tertiaires. La baisse des rendements agricoles dans les pays en développement, ajoutée à l'évolution du secteur tertiaire, la faible demande de travail dans les unités agro-industrielles contraignent les agents économiques du milieu rural à s'orienter vers le secteur de service au détriment de l'agriculture (Boyer J., 2010), cité par (Déméus A. et *al*., 2022). Selon l'auteur, la main-d'œuvre salariale autrefois, alternative de substitution à la main-d'œuvre familiale est devenue rare pour des raisons socio-économiques.

Le développement de toutes politiques stratégiques en faveur de l'agriculture contraint à une compréhension des perceptions des obstacles culturaux par les ménages agricoles et leur comportement d'adaptation. L'Objectif de l'étude est d'analyser le comportement des ménages agricoles face aux difficultés de mobilisation de la main-d'œuvre agricole dans cette commune. L'intérêt accordé à la filière agricole repose sur les enjeux de développement économique et de réduction de la pauvreté (Saliou I.O. et *al.*, 2020).

Situation géographique de la commune de Zè

La commune de Zè est située entre les parallèles 6°33' et 6°58' de latitude nord et entre 2°03' et 2°27' de longitude est (Figure 1).

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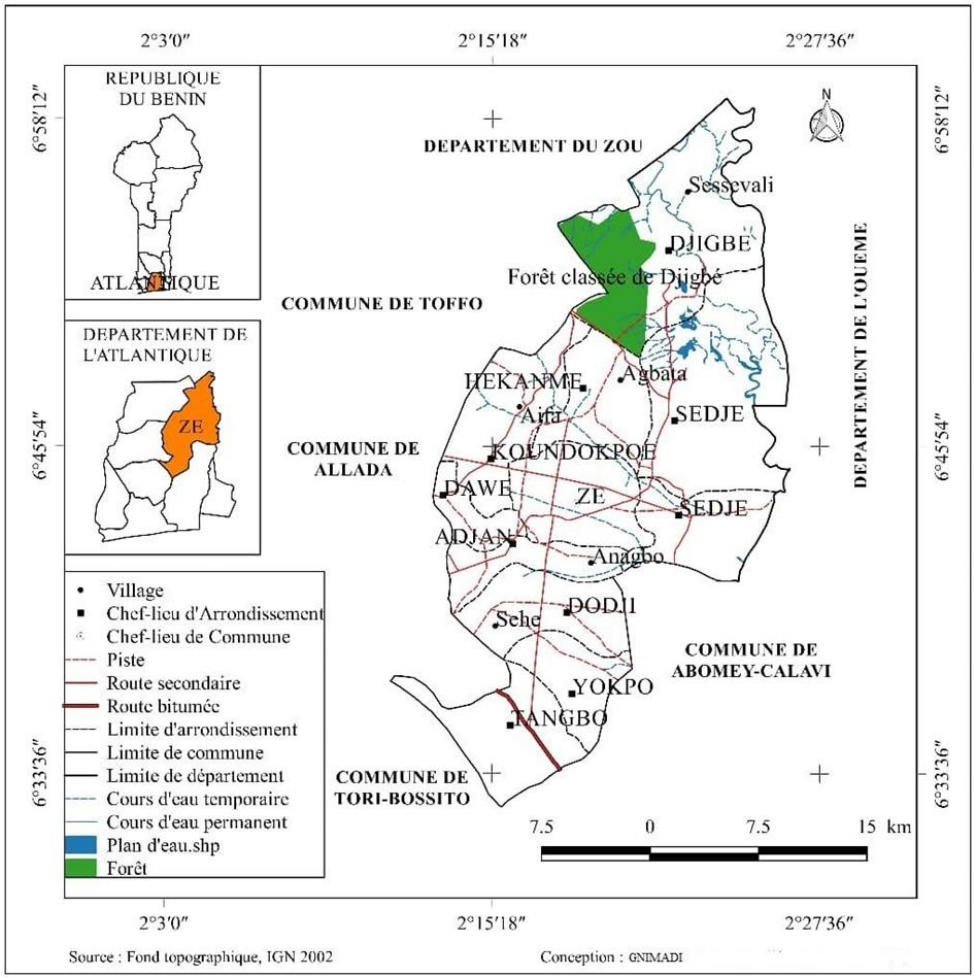
Figure 1: Situation géographique et administrative de la commune de Zè



La commune de Zè est limitée au nord par les Communes de Zogbodomey et de Toffo, au sud par celles d'Abomey-Calavi et de Tori-Bossito, à l'est par les Communes d'Adjohoun et de Bonou et à l'ouest par celle d'Allada. Elle couvre une superficie de 653 km^2 et compte 73 villages répartis dans 11 arrondissements à savoir : Adjan, Dawé, Digbé, Dodji-Bata, Hêkanmè, Koundokpoè, Sèdjè-Dénou, Houègoudo, Tangbo-Djèvié, Yokpo et Zè (Quenun Y. B. et *al*, 2014).

Matériel et méthodes

Collecte des données

La collecte des données et informations s'est faite au moyen de la recherche documentaire et l'enquêtes de terrain.

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Type de données collectées

Les données utilisées dans l'étude sont relatives aux informations sur la typologie de la main-d'œuvre agricole, sa rémunération et les stratégies d'adaptation à la cherté de la main-d'œuvre agricole dans le milieu d'étude. La recherche documentaire et l'enquête de terrain ont permis de collecter les différentes informations.

Techniques de collecte de données

- **Recherche documentaire**

La recherche documentaire est la première phase de collecte des données. Elle a consisté à mener des investigations dans les centres de documentation des institutions spécialisées (FAO, Banque Mondiale, FIDA), des bibliothèques (BIDOC-FSA), sur le réseau internet et autres organismes susceptibles de fournir des informations relatives au sujet de recherche. Elle a permis de mieux cerner la problématique et de faire l'état des connaissances. Les différentes informations obtenues ont été complétées par l'enquête de terrain.

- **Enquête de terrain**

Elle a consisté en la collecte des données et informations en milieu réel et ayant permis de faire des illustrations des faits de la main-d'œuvre agricole. Elle a pris en compte les enquêtes par questionnaire, les entretiens directifs et semi-directifs. La connaissance du milieu d'étude a été faite par l'observation directe. Au cours de cette phase, les pratiques agricoles et les conditions de travail des ouvriers ont été observées.

Outils de collecte des données

Questionnaire

L'enquête par questionnaire a été réalisée dans les ménages pour appréhender les opinions et perceptions des chef de ménages sur la cherté de la main-d'œuvre.

- **Guide d'entretien**

Les entretiens ont été faits avec plusieurs personnes dont les élus locaux et les responsables des producteurs.

- **Grille d'observation**

La grille d'observation a permis d'apprécier les conditions de travail des ouvriers agricoles.

Matériel de collecte des données

Il s'agit d'un appareil photographique numérique pour les prises de vues permettant d'illustrer les faits et la carte géographique pour la situation du milieu d'étude.

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Echantillonnage

L'échantillon est constitué des ménages agricoles, des responsables des producteurs, les techniciens des Agences Territoriales de Développement Agricoles (ATDA). Le choix est raisonné et tient compte des variables suivantes : sexe 80 % des hommes et 20 % des femmes, âge 25 ans révolus. Le choix des personnes enquêtées repose sur les critères suivants : être chef de ménage, avoir vécu dans la commune pendant au moins 10 ans, avoir au moins 1 hectare comme superficie de l'exploitation agricole. Les 150 chefs ménages ont été interrogés. A ceux-ci, s'ajoutent 6 responsables de producteurs, 3 chefs d'arrondissement, 1 technicien de l'Agence Territoriale de Développement Agricole (ATDA), soit 160 personnes enquêtées.

Traitement des données

Dépouillement des données et informations collectées

Les questionnaires ont été dépouillés manuellement, codés, dénombrés et les réponses obtenues sont intégrées dans l'ordinateur. La quantification des résultats d'enquête a été réalisée sur la base du score réel (réponses positives et négatives) de chaque rubrique du questionnaire et non à partir du nombre total des personnes interrogées.

Traitement des données et informations

Le traitement des données collectées est fait à l'aide du logiciel Word et du tableur Excel 2013. Le logiciel Word 2013 a été utilisé pour la saisie des informations et données recueillies. Les informations ainsi obtenues sont transformées en figures et tableaux grâce au tableur Excel 2013. Les différentes cartes sont réalisées avec le logiciel ARCGIS 10.5.

Résultats

Caractéristique de la main-d'œuvre agricole dans la commune de Zè

Structure de la population agricole de la Commune de Zè

Tableau N° I : Population agricole par tranche d'âge

Arrondissements	Populatios agricole	Masculin	Féminin	Groupe d'âge		
				[0-14]	[15 - 59]	[60 ans et Plus]
Adjan	5676	2 745	2 931	2728	2675	273
Dawé	4099	1 982	2 117	1970	1932	197
Djigbé	2405	1 163	1 242	1156	1133	116
Dodji-Bata	8916	4 312	4 604	4285	4202	430
Hêkanmè	8845	4 278	4 567	4251	4168	426
Koundokpoè	5905	2 856	3 049	2838	2783	284
Sèdjè-Dénou	4929	2 384	2 545	2369	2323	237
Houègoudo	5202	2 516	2 686	2500	2451	251
Tangbo-Djèvié	7481	3 618	3 863	3595	3525	360
Yokpo	5992	2 898	3 094	2880	2824	289
Zè	9391	4 542	4 849	4513	4425	452
Total	68841	33 292	35 549	33 084	32 440	3 317

Source : Données INSAE, et de terrain, mars 2023

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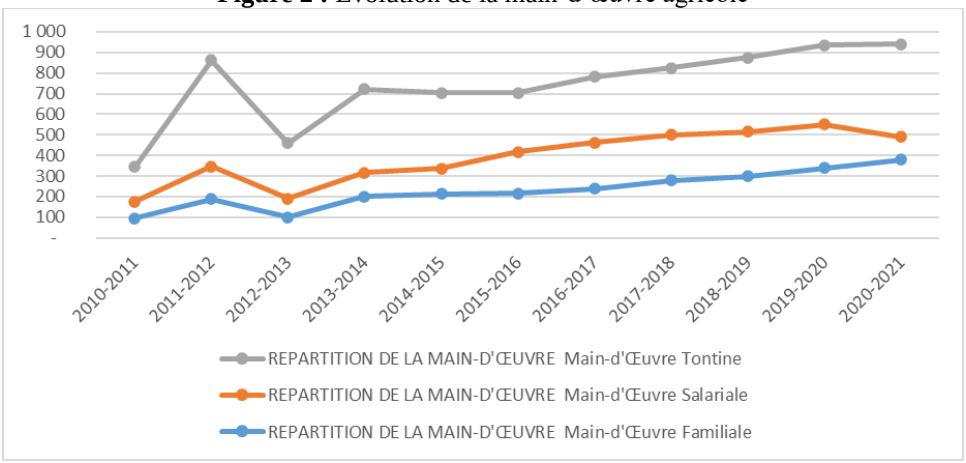
L'examen du tableau I révèle la prédominance de la main-d'œuvre agricole féminine (52 %) contre (48 %) d'hommes. La prédominance des femmes dans l'agriculture dans la Commune de Zè n'est pas une particularité Béninoise. Elle caractérise le secteur agricole d'autres pays comme le Chine et l'Inde (BRÜKE, 2010). La structure de la population agricole dans la Commune de Zè, comprend 48 % de [0 à 14] ans contre 47 % pour les personnes ayant [15-59] ans et 5 % pour les [60 ans et plus]. La population agricole réelle de la Commune de Zè comprend des actifs agricoles de 15 à 60 ans et plus soit 53 % de la population agricole totale. La main-d'œuvre agricole locale est une partie intégrante des 53 % des actifs agricoles.

Evolution de la main-d'œuvre

La main-d'œuvre agricole varie selon le temps et la nature des activités agricoles sur l'exploitation (Figure 2).

Figure 2 : Evolution de la main-d'œuvre agricole



Source : Enquête de terrain, mars 2023

La lecture de la figure 2 met en exergue trois types de main-d'œuvre agricoles dans la Commune de Zè. Il s'agit de la main-d'œuvre familiale, la main-d'œuvre salariale et la main d'œuvre tontine. L'usage de la main-d'œuvre tontine tend à devenir la première force de travail dans la commune de Zè. Cette main-d'œuvre a connu une croissance plus prononcée que la main-d'œuvre familiale et la main-d'œuvre salariale. En effet, la main-d'œuvre tontine est un apport solidaire au profit d'un producteur qui se réalise sous forme de prêt ou de crédit de main-d'œuvre (Magnon Y.Z., et *al*., 2018). Les 55 % des agriculteurs estiment que c'est la main-d'œuvre alternative qui permet de respecter le calendrier cultural, contre 30 % pour la main d'œuvre familiale et 15 % pour la main-d'œuvre salariale. Cette main-d'œuvre est utilisée pour les travaux champêtres relatifs aux opérations de défrichement (45 %), de sarclage (30 %), de labour (25 %).

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Elle favorise, toutefois, la cohésion entre les producteurs et permet d'emblaver de grandes superficies et à bonne date (75 %). Le coût de la main-d'œuvre dans le milieu d'étude varie selon les opérations culturales et les campagnes agricoles (Tableau II).

Tableau II: Evolution des salaires agricoles

Campagnes agricoles	COÛT DES OPERATIONS CULTURALES (FCFA)					TOTAL (CFA)
	Défrich	Labour	Semis	Sarclage	Récolte	
2010-2011	47 500	270 000	36 000	75 000	25 000	453 500
2011-2012	48 450	278 100	36 720	76 500	25 500	465 270
2012-2013	49 904	289 224	37 822	78 795	26 265	482 009
2013-2014	51 900	300 793	39 334	81 947	27 316	501 289
2014-2015	54 495	511 348	41 301	86 044	28 681	721 869
2015-2016	57 764	542 029	43 779	91 207	30 402	765 182
2016-2017	62 385	590 812	47 282	98 503	32 834	831 816
2017-2018	67 376	643 985	51 064	106 384	35 461	904 270
2018-2019	72 766	695 503	55 149	114 894	38 298	976 611
2019-2020	79 315	765 054	60 113	125 235	41 745	1 071 461
2020-2021	86 454	841 559	65 523	136 506	45 502	1 175 543

Source : Données INSAE, et de terrain, mars 2023

La lecture du tableau II met en exergue l'évolution de la main-d'œuvre agricole de 11 campagnes agricoles dans les exploitations agricoles de la Commune de Zè. Sur la période de référence, les travaux relatifs aux labours viennent en tête avec 69 % des dépenses totale des opérations culturales contre 13 % pour le sarclage, 8 % pour le défrichement, 6 % pour les semis et 4 % pour les travaux de récolte. Le coût de la main-d'œuvre varie en fonction de la nature de l'opération culturale. Il est presque triplé en 11 ans passant de 453 300 francs CFA en 2010 à 1 175 543 francs CFA en 2021. Le taux d'accroissement sur la période est d'environ 61 % avec une proportion moyenne annuelle de 5,58 %. Le taux d'accroissement moyen annuel par nature d'opérations culturales est de 6,17 % pour le labour contre 4,10 % pour les autres activités culturales dans le Commune de Zè. Les 80 % des producteurs enquêtés affirment que l'insuffisance de la main-d'œuvre agricole est due à plusieurs facteurs à savoir les facteurs climatique, social, économique et les conditions drastiques de travail.

Perception des causes de la cherté de la main-d'œuvre agricole dans la Commune de Zè

La cherté de la main-d'œuvre agricole dans la Commune de Zè trouve ses origines dans la variabilité climatique, la mobilité social et économique et les conditions difficiles de travail.

Facteurs climatiques

La variabilité climatique engendre des difficultés de mobilisation de la main-d'œuvre salariale. Elle fait retarder les opérations culturales

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(défrichement, labour, semis, sarclage, récolte) selon 80 % des producteurs enquêtés. La lenteur notée dans le respect du calendrier cultural oblige la main-d'œuvre agricole salariale à s'orienter vers d'autres activités génératrices de revenus. La main-d'œuvre devient ainsi insuffisante voire rare au moment des travaux. Les 25 % des enquêtés pensent que la solution à ce problème se trouve dans la maîtrise des effets des changements climatiques à travers la connaissance approfondie du phénomène et l'adaptation au nouvel ordre cultural imposé par la variabilité climatique.

Facteurs socio-économiques

Facteur social

La scolarisation des enfants est l'une des causes de l'insuffisance de la main-d'œuvre. Selon 80 % des producteurs enquêtés, les enfants en âge de scolarisation ou d'apprentissage prennent le chemin des écoles ou des ateliers laissant le chef de la famille et ses femmes s'occuper des travaux champêtres. Les 60 % des ménages agricoles interrogés, affirment que les enfants constituent la première force de travail dans l'agriculture traditionnelle. Pour eux, le seul handicape au développement de l'agriculture est la rareté de ce type de main-d'œuvre gratuite offert par « dieu ». Cette affirmation se justifie dans la mesure où la production agricole se transmet de père en fils (Agalati B., et *al.*, 2018). Cette main-d'œuvre travaille sur la base des connaissances empiriques. Toutefois, l'Agence Territoriale de Développement Agricole (ATDA) organise des formations agricoles sur le terrain à l'intention des chefs de ménages agricoles. Les 34, 19 % des ménages agricoles affirment que les formations techniques en agriculture permettent d'avoir des retours sur l'efficacité des périmètres agricoles. L'étude révèle que les 75 % des actifs agricoles ne sont pas instruits contre 20 % et 5 % qui ont respectivement les niveaux secondaires et universitaires. Cependant, aucun des ménages agricoles n'a reçu une formation formelle en technique agricole.

Facteurs économiques

La faible productivité dans le secteur agricole de même que les difficultés de mobilisation ressources financières pour le financement de la main-d'œuvre salariale contribuent à la réduction de la main-d'œuvre agricole. Selon 80 % des ménages agricoles, l'agriculture n'est plus financièrement rentable à cause de la pression foncière et la pauvreté des sols.

Mauvaises conditions de travail agricole

L'agriculture est encore traditionnelle dans la commune. Les différentes opérations culturales se font à l'aide d'outils archaïques comme la houe, le coupe-coupe, etc. Ces outils ne permettent pas aux ouvriers d'exercer facilement les activités. Ils abandonnent les activités agricoles au profit des

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activités commerciales afin d'avoir de bons revenus pour subvenir à leurs besoins financiers. Toutes ces difficultés conduisent les agriculteurs à l'usage intensif des herbicides, des intrants chimiques, de la main-d'œuvre familiale et de la main-d'œuvre tontine « *Adjolou* » Gnimadi C. C., 2012).

Solution d'adaptation à la cherté de la main-d'œuvre agricole
Usage des herbicides et des intrants chimiques

Dans la commune de Zè, les producteurs utilisent les herbicides afin de faire face à la cherté de la main-d'œuvre. Les herbicides en liquide ou en poudre, conditionnés dans des bidons, des sachets, ou dans des plastiques, etc. sont utilisés pour des travaux qui exigent la force physique (défrichement et labour) au nombre desquels on distingue les herbicides qui tuent les mauvaises herbes (killer). Les herbicides sélectifs que sont Calliforg, Kallach, Cotochem, Cotonex sont utilisés dans les champs cultivés. Au nombre des produits chimiques les plus usités, il y a le Glyphosate et l'Atrazine. L'usage des herbicides a également pour rôle d'empêcher les adventices d'envahir plus tôt les champs. L'emploi de ceux-ci réduit la charge de travail consacrée au désherbage manuel dans la mesure où l'application de l'herbicide exige moins d'une journée de travail par hectare. Les herbicides utilisés dans le milieu d'étude sont affichés sur la photo 2.

Photo 2: Herbicides utilisés à Zè
Prise de vue: Gnimadi, janvier 2023

Plusieurs étapes marquent l'application des herbicides sélectifs dans les spéculations : (i) traitement de pré-semis (après la préparation du sol et avant le semis de la culture), (ii) traitement de post-semis (48 heures après le semis), (iii) traitement de pré-levée (avant la levée de la plante considérée), (iv) traitement de post-levée (après la levée de la plante). Les traitements de

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pré-levée et post-levée permettent d'inhiber les adventices pour favoriser la croissance rapide de la plante. La réalisation des traitements des insecticides obéit à une logique appelée fenêtre. Pour avoir un bon rendement de la spéculation, il faut en moyenne six (06) à sept (07) traitements avant les opérations de semis et 12 traitements avant la récolte selon le cas. Le tableau III présente le test Khi^2.

Tableau III : Test Khi^2

Q7*Q10 Croisstabutation					
			Q7 : Quelles sont les stratégies d'adaptation à la pénurie de la main d'œuvre ?		Total
			Utilisation des herbicides	Réduction des superficies	
Q10 : Quels sont les avantages de l'utilisation des herbicides ?	Facilite la préparation du champ	Count	41	39	80
		(%) within Q7	51,25%	48,75%	100,0%
	Réduire la charge de travail	Count	38	52	90
		(%) within Q7	42,22%	57,78%	100,0%
Total		Count	79	91	170
		(%_ within Q7	46,47%	53,53%	100,0%

Source : Enquête de terrain, mars 2023

Les 100% des acteurs agricoles estiment que l'usage des herbicides offre plusieurs avantages. Les 51,25% pensent que l'utilisation des herbicides facilite la préparation du champ contre 42,22% pour qui l'utilisation des herbicides permet de réduire la charge de travail pour certaines opérations culturales (le défrichement, le sarclage, le labour). La solution pour la maîtrise des opérations culturales et le respect du calendrier agricole réside dans la réduction des superficies emblavées pour 48,75% des agriculteurs enquêtés contre 57,75% qui pensent que la réduction des emblavures permet de réduire la diminution de la charge de travail.

Discussion

L'agriculture mobilise 64, 39 % de la population totale dans la Commune de Zè. Dans le milieu d'étude, l'agriculture est tributaire de la main-d'œuvre. L'étude permet de constater qu'il existe trois grands types de main-d'œuvre agricole : main-d'œuvre familiale, main-d'œuvre salariale et main-d'œuvre tontine. Les trois types de main-d'œuvre sont **i**mportan**ts** dans les travaux de production agricole dans la commune de Zè. Ces résultats corroborent ceux de Kiki G. (2020). Ils sont similaires à ceux trouvés par Feliho G. et *al*., (2020). Ces auteurs dans leurs études sur « Caractéristiques des exploitations agricoles familiales dans le triplet Djidja, Zakpota et Covè dans le Département du Zou au Bénin, constate que les producteurs agricoles font usage de 40 % de la main-d'œuvre tontine. Dans le même ordre d'idées, Magnon Y.Z. et *al*., (2018) tire de leurs travaux sur « l'analyse des effets des crédits de main-d'œuvre agricole « *Gbèglé* » sur l'amélioration des facteurs de production et de revenu des agriculteurs dans les Communes de Tori-

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Bossito et Kpomassè au Sud-Ouest du Bénin, la conclusion que ce type de main s'utilise pour les grosses opérations culturales à savoir le défrichement, le débroussaillage, le sarclage et le labour. Dans le milieu d'étude, les producteurs utilisent les herbicides afin de face faire à la cherté de la main-d'œuvre. En effet, ces produits chimiques sont sous forme de liquide, de poudre et sont conditionnés dans des bidons, sachets ou plastique, etc. Parmi ces produits, on distingue les herbicides Killer qui tuent les mauvaises herbes. Ces résultats sont similaires à ceux de (Kobta R. W., 2023 ; Saliou I. O. et *al*., 2020) pour qui la rareté de la main-d'œuvre a pour conséquence l'augmentation du coût des opérations culturales au Bénin pour les campagnes agricoles de 2000 à 2018. L'étude révèle que les causes de l'augmentation de ce facteur de production résident dans les variabilités climatiques, les facteurs socio-économiques et les conditions de travail agricole. Ces résultats sont contraires à ceux trouvés par Deméus A., et *al*. (2022) pour qui les causes sont à rechercher au niveau de la faiblesse de la technicité agricole. Les résultats mettent en exergue la prédominance de la main-d'œuvre féminine dans les exploitations agricoles de la Commune de Zè. Cette dominance de la main-d'œuvre féminine n'est pas une particularité Béninoise car elle caractérise aussi, le secteur agricole d'autres pays comme l'Inde et la Chine (Brük, 2010).

Conclusion

L'étude permet de constater qu'il existe trois types de main-d'œuvre agricole la main-d'œuvre familiale, la main-d'œuvre salariale et la main-d'œuvre tontine. La dernière tend à devenir la solution alternative dans le milieu d'étude pour palier le retard observé dans le déroulement du calendrier cultural. La main-d'œuvre tontine se révèle être la réponse à l'amélioration des facteurs de production agricole. Les difficultés de mobilisation de mobilisation de la main-d'œuvre agricole dans la Commune de Zè trouvent leurs origines dans la variabilité climatique, les facteurs socio-économiques et les conditions de travail. Les agriculteurs, pour palier à ces difficultés font usage des herbicides, des intrants chimiques et de la main-d'œuvre tontine.

Déclaration pour les participants humains : Cette étude a été approuvée par le Centre Béninois de la Recherche Scientifique et de l'Innovation (CBRSI) et les principes de la Déclaration d'Helsinki ont été respectés. Les informations fournies par les enquêtés ont été protégées et confidentielles.

Conflit d'intérêts : Les auteurs n'ont signalé aucun conflit d'intérêts.

Disponibilité des données : Toutes les données sont incluses dans le contenu de l'article.

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Evidence of komatiitic basalt enclaves in the Téra-Ayorou pluton (Liptako, West Niger) (West African Craton)

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Abstract

The present study focuses on the basic enclaves (amphibolo-pyroxenites) of the Téra-Ayorou pluton in Niger Liptako (NE portion of the Man Ridge of the West African Craton). The methodology used includes field observations, supported by polarizing microscope observations of thin sections and geochemical analyses of whole rock. These enclaves are characterized by high MgO, low Na_2O, K_2O, and TiO_2 contents, high CaO/Al_2O_3 ratios, depletion of light rare earth and enrichment in Ni and Cr. These basic enclaves are thought to come from certain basic to ultrabasic Pogwa and Ladanka plutonites in the Diagorou-Darbani greenstone belt, with which they share the same geochemical characteristics. This suggests that these enclaves were ripped out by the pluton as it was being emplaced. The basic enclaves and basic plutonites with ultrabasites have different signatures from those of the birimian basites of the West African Craton, which are tholeiitic and calc-alkaline. The amphibolo-pyroxenite enclaves of the Téra-

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Ayorou pluton and the basic to ultrabasic plutonites of the Diagorou-Darbani greenstone belt constitute a fairly continuous line of komatiitic rocks from peridotites (serpentinites) to basalts (metapyroxenites, amphibolites). This komatiitic lineage results from the fractional crystallization of a magmatic liquid from a mantle source with variable partial melting rates. The komatiitic line and the tholeiitic and calc-alkaline lines are closely intertwined in the field.

Keywords: Basic enclaves of Téra-Ayorou Pluton, Niger Liptako, West African Craton, Komatiitic line, Fractional crystallization

Introduction

The Baoulé-Mossi area of the West African Craton is characterized by alternating granitoids and greenstone belts (Grenholm, 2019). These are characterized by a lithostratigraphic succession comprising a volcanic unit at the base and a sedimentary unit at the top (Baratoux et al., 2011, 2015; Grenholm, 2019). Two magmatic lines have been distinguished within the volcanic complex: the tholeiitic line and the calc-alkaline line (Baratoux et al., 2011; Grenholm, 2019). According to the authors, the tholeiitic lineage characterizes an emplacement in a MORB-type oceanic domain (Lompo, 2009), an oceanic shelf area (Pouclet et al., 1996), or an island arc domain (Ama Salah et al., 1996; Soumaila et al., 2004, 2008). The calc-alkaline lineage characterizes an emplacement in a subduction context (Soumaila et al., 2008). Granitoids are essentially composed of TTGs and are intrusive in greenstone belts (Parra-Avila et al., 2017). The granitoids contain numerous basic and ultrabasic enclaves (Machens, 1973). The Téra-Ayorou pluton (Nigerian Liptako), which is the subject of this study, contains numerous enclaves of amphibolites, pyroxenites, and amphibolo-pyroxenites. These enclaves have not previously been the subject of any detailed, in-depth study. The aim of this study is to determine the petrography, geochemistry and magmatic lineage of these enclaves.

Geological context

The West African Craton is made up of two ridges, the Réguibat ridge to the north and the Léo-Man ridge to the south (Figure 1), each comprising an Archaean western province dated at 3.5 to 2.7 Ga (Kouamelan et al., 2015; Rollinson, 2016) and an eastern Birimian province dated at 2.7 to 1.96 Ga (Grenholm, 2019).

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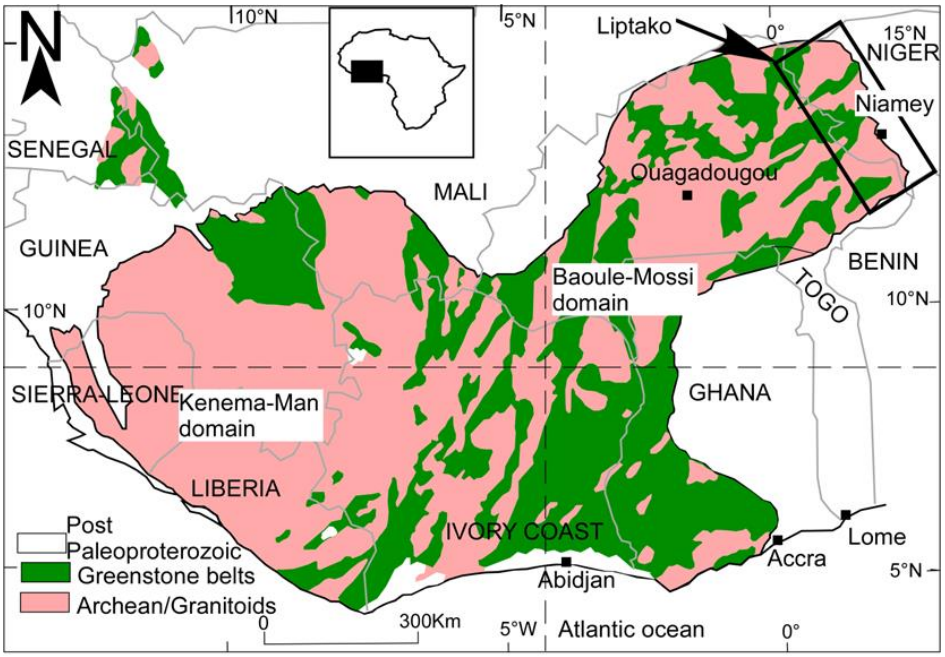

Figure 1: Synthetic geological map of the Man Ridge (from Milési et al., 1989)

The Niger Liptako corresponds to the north-eastern (NE) edge of the Léo-Man ridge (Figure 1). It is characterized by alternating greenstone belts (Gorouol, Diagorou-Darbani, Sirba, and Makalondi) and granitoid plutons (Téra-Ayorou, Dargol-Gothèye, and Torodi) trending broadly NE-SW (Ahmed et al., 2022) (Figure 2). The geological formations in the greenstone belts are metabasalts, amphibolites, ultramafic and mafic intrusive units, often transformed into talcshists and chloritoschists, detrital sediments with little metamorphism, and small volumes of plutonic and volcanic rocks with intermediate to acidic chemistry (Ama Salah et al., 1996; Soumaila et al., 2004; Garba Saley et al., 2021; Hallarou, 2021). Granitoids are mainly composed of TTGs (tonalite, trondhjemite, granodiorite) (Pons et al., 1995).

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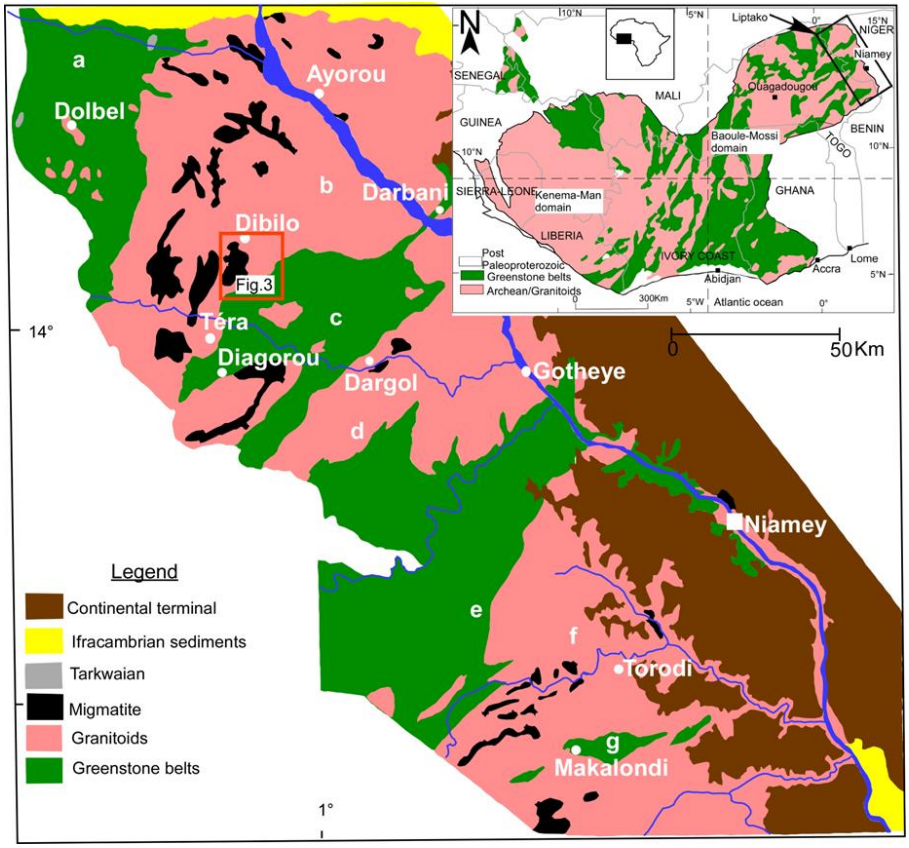

Figure 2: Simplified geological map of Liptako (Machens, 1973; Dupuis et al., 1991, modified). a: Gorouol greenstone belt; b: Pluton of Téra-Ayorou; c: Diagorou-Darbani greenstone belt; d: Pluton of Dargol-Gothèye; e: Sirba greenstone belt; f: Pluton of Torodi; g: Makalondi greenstone belt

The Téra-Ayorou pluton is located in the northern part of the Nigerian Liptako. It is a syn to late-tectonic pluton emplaced during the Paleoproterozoic (U-Pb and K-Ar dating: 2158 Ma ± 9 (Lama, 1993; Cheilletz et al., 1994). The geology of this pluton is represented by migmatites, granodiorites, and calc-alkaline biotite- or 2 micas-bearing granites, with enclaves of amphibolite and pyroxenite (Machens, 1973; Pons et al., 1995). These formations are intersected by veins of quartz and pegmatites (Attourabi et al., 2021; Ahmed et al., 2022) and late dolerites (Noura et al., 2023a) (Figure 3).

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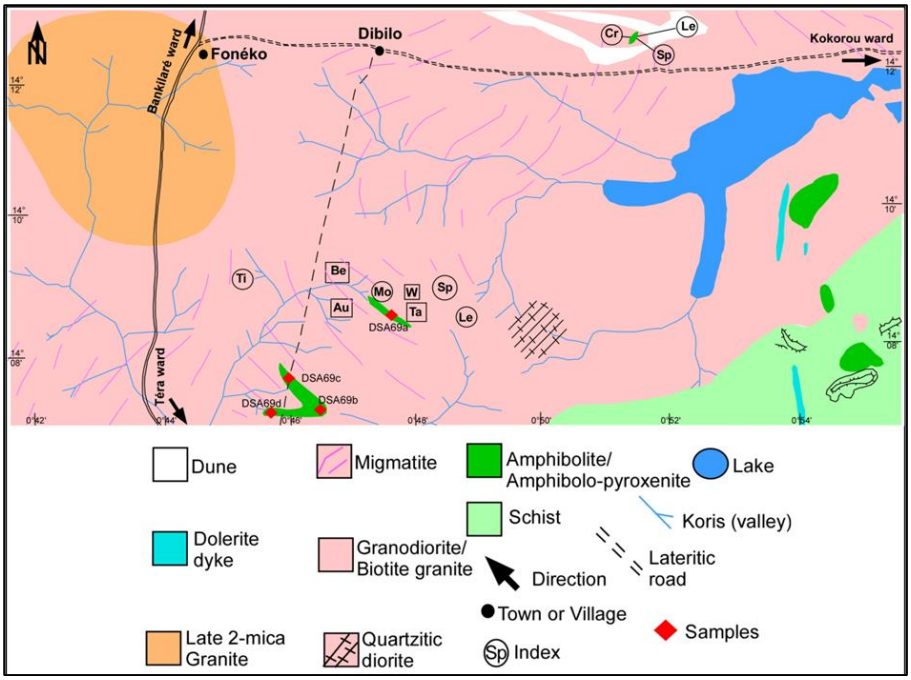

Figure 3: Simplified geological map of Dibilo (Machens, 1961; Attourabi et al., 2021; Ahmed et al., 2022)

Methodology

The methodology used for this study consisted of fieldwork and laboratory work. The fieldwork consisted of a petrographic description of the enclaves and sampling.

The laboratory work involved making 3 thin sections (DSA69b, DSA69c, DSA69d) at the "Centre de Recherche Géologique et Minière" (CRGM) in Niger, and their observations in unanalyzed polarised light (LPNA), analyzed polarised light (LPA) and reflected light using a LEICA DM2700 microscope equipped with five ×5, ×10, ×20, ×50, ×100 magnification objectives and an image capture device connected with computer. These observations were made at the Georesources Laboratory in the Geology Department of the Abdou Moumouni University in Niamey.

One sample (DSA69a) was analyzed at the ‘’Service d'Analyse des Roches et Minéraux (SARM)’’ of the "Centre de Recherches Pétrographiques et Géochimiques (CRPG) " in Nancy, France. Major element (SiO2, Al2O3, Fe2O3, MnO, MgO, CaO, Na2O, K2O, TiO2, P2O5, PF, Total) values were obtained by ICP-OES (Inductively Coupled Plasma-Optical Emission Spectrometry) with a Thermo Fischer iCap6500 and trace element and rare earth element (As, Ba, Be, Bi, Cd, Co, Cr, Cs, Cu, Ga, Ge, Hf, In, Mo, Nb, Ni, Pb, Rb, Sb, Sc, Sn, Sr, Ta, Th, U, V, W, Y, Zn, Zr, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Li) values were obtained by ICP-MS

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(Inductively Coupled Plasma-Mass Spectrometry) and ICP-OES with a Thermo Fischer iCap6500. The geochemical diagrams were produced using GCDkit 6.1_for R.4.1.3 software (Janoušek et al., 2006).

Results and Discussion

Petrography

In the study area (Téra-Ayorou granitoid pluton), enclaves of greenstone belts were observed to the south of Dibilo, to the south of Fonéko, to the south of Kokorou and to the west part of Téra. These enclaves are represented by amphibolo-pyroxienites. The rock is blackish and shows an N10° to N20° foliation. This foliation is marked by alternating dark beds (amphibole or pyroxene) and light beds (feldspar) (Figure 4). These enclaves are intersected by quartz veins running N-S and N130°.

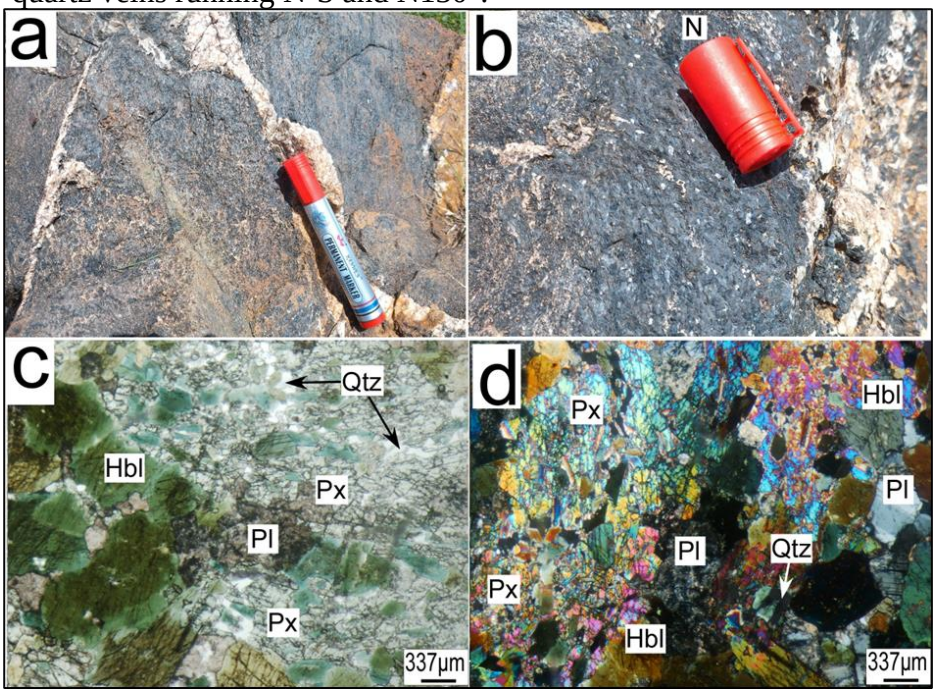

Figure 4: Amphibolo-pyroxenite enclaves crossed by quartz veins south of Dibilo. (c, d, e and f) LPNA and LPA microphotographs of the enclave showing the mineralogical association: Hornblende (Hbl), Pyroxene (Px), Plagioclase (Pl), and Quartz (Qtz)

Microscopically, amphibo-pyroxenites have a granoblastic texture. They are composed of quartz, plagioclase, amphibole (hornblende), and pyroxene (Figure 4). Quartz is present in the form of large mono and/or polycrystalline patches or as small interstitial crystals. It sometimes forms rectilinear inclusions in the poeciloblasts of hornblende. Plagioclase is strongly sericitised and occurs as automorphous, mottled crystals (polysynthetic twins), or as microcrystals included in the poeciloblasts of

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hornblende. Amphibole is green hornblende. It occurs as pleochroic automorphic crystals in green hues (in LPNA). Hornblende sometimes has one cleavage plane (longitudinal section) or two cleavages (transverse section). In the elongated section, extinction occurs obliquely to the cleavage plane. Pyroxene occurs in the form of orthopyroxene crystals, which are largely ouralitized.

Discussion

The amphibole-pyroxenite enclave studied is characterized by a high MgO content (11.60 wt%) (Figure 5a), low alkali (Na_2O: 1.43 wt%; K_2O: 0.72 wt%) and TiO_2 (0.61 wt%) (Figure 5b), a high CaO/Al_2O_3 ratio (1.6) and a depletion in light rare earth and an absence of Eu anomalies (Figure 6a), with negative anomalies in Th, Nb and positive in Pb and U (Figure 6b) (Table 1).

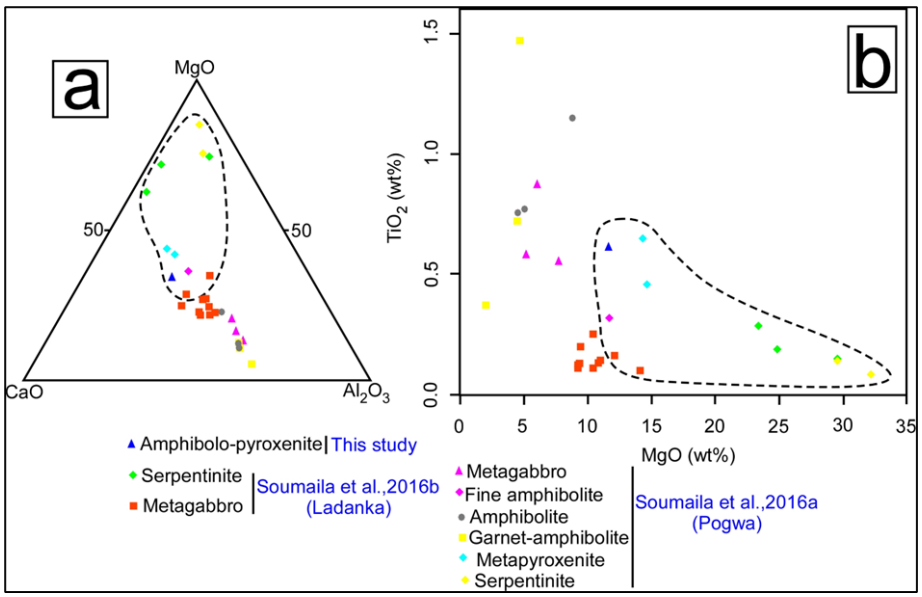

Figure 5: Projection of the amphibolo-pyroxenite enclave of the Téra-Ayorou (this study) and the basic to ultrabasic plutonites of the Diagorou-Darbani belt (Soumaila et al., 2016a, 2016b) in the diagrams of Blais et al. (1977): (a) CaO-MgO-Al2O3; (b) MgO vs TiO2.

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Table 1: Majors and trace elements analyses of the Pogwa Rocks (Soumaila et al.,2016a) and the Tera-Ayorou enclaves (this study)

	Soumaila et al., 2016a													This study
Rocks	Metapyrox		Metagabbro			Grt-AmphPg			Grt free AmphPg			F-AmphPg	Ultrabasic		Am-Px
Samples	Fpd-21	Fpd-21	Fpd-3	Fpd-22	Fpd-4	Fpd-5	Fpd-13	Fpd-7	Fpd-17	Fpd-18	Fpd-20	Fpd-12	Th738	Th538	DSA69a
SiO2	49,36	50,42	45,45	46,46	44,57	49,39	43,66	44,79	45,38	44,54	45,63	55,52	39,63	44,46	47,21
Al2O3	7,81	6,63	19,45	20,45	23,06	26,4	21,95	24,18	23,48	17,62	23,31	9,5	3,14	5,78	8,85
Fe2O3	1,31	1,34	1,02	1,02	0,79	0,45	1,28	0,92	0,92	1,28	0,94	0,97	1,25	0,98	13,39
MnO	0,21	0,24	0,13	0,12	0,08	0,06	0,17	0,1	0,1	0,16	0,11	0,18	0,18	0,15	0,29
MgO	14,35	14,66	7,67	5,97	5,13	2,05	4,69	4,49	4,47	8,77	4,95	11,7	32,19	29,5	11,60
CaO	12,06	12,12	11,72	11,88	12,53	13,15	12,33	13,59	13,41	12,11	13,19	11,05	2,57	4,23	13,83
Na2O	0,81	0,76	2	2,4	2,12	2,57	2,04	2,08	2	1,62	2,04	1,37	0,19	0,05	1,43
K2O	-	-	0,51	0,11	1,07	-	-	-	-	0,13	0,05	0,09	0	0	0,72
TiO2	0,65	0,46	0,55	0,87	0,58	0,37	1,47	0,72	0,76	1,15	0,77	0,32	0,09	0,14	0,61
P2O5	0,06	0,09	0,06	0,16	0,09	0,16	0,25	0,16	0,12	0,05	0,08	0,05	0,07	0,05	0,15
Total	98,58	99,87	98,93	99,85	99,87	99,83	99,89	99,81	99,68	99,85	100,1	100,4	98,99	99,43	99,31
Ba	33,26	22,24	139,9	77,25	449,6	112,4	128	54,61	86,36	74,21	72,98	138,7	9,5	0,9	70,43
Ce	18,56	22,6	8,5	21,76	8,76	18,48	22,19	15,27	14,8	16,09	14,97	14,86	1,04	0,66	11,28
Co	53,98	58,51	39,78	36,59	35,56	12,4	33,78	29,36	27,68	54,91	30,39	47,09	117	83,9	82,75
Cr	1499	743,7	198,9	154,1	198,9	154,1	19,16	49,09	9,94	20,24	107	1175	3285	2940	2202,34
Dy	3,39	2,72	1,72	3,92	1,72	3,92	1,55	2,18	5,81	3,49	3,4	1,61	0,36	0,5	1,90
Er	1,8	1,48	0,95	2,11	0,95	2,11	0,87	1,18	3,39	1,94	1,87	0,95	0,23	0,29	1,09
Eu	1,02	0,82	0,8	1,57	0,85	1,21	1,68	1,25	1,16	1,25	1,24	0,58	0,08	0,09	0,69
Gd	3,79	3,21	1,87	4,62	1,76	2,56	5,84	3,71	3,88	4,26	3,69	1,82	0,33	0,29	1,87
Hf	1,07	1,05	0,59	1,23	0,59	0,75	1,32	0,9	1,02	1,21	0,89	0,97	0,16	0,18	1,35
Ho	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,40
La	0,53	6,53	3,28	7,46	3,58	8,34	7,16	5,19	5,43	4,93	5,26	8,34	0,45	0,24	4,42
Lu	0,25	0,24	0,13	0,3	0,12	0,17	0,51	0,26	0,29	0,32	0,26	0,16	0,04	0,06	0,17
Nb	2	2,46	0,99	2,45	0,98	1,75	4,74	1,7	1,79	1,82	1,87	1,45	0,13	0,17	3,37

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Nd	15,77	17,82	6,9	18,72	6,71	12,08	20,28	13,79	13,22	15,35	13,65	9,74	0,69	0,58	7,75
mg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ni	116,3	127,3	91,49	81,1	29,74	25,74	6,2	7,8	6,58	22,64	45,44	66,2	1229	1234	592,94
Pb	-	-	2,24	2,2	2,88	3,79	2,16	2,63	2,62	-	3,01	8,88	0,47	0,26	2,57
Pr	3,14	3,9	1,33	3,68	1,33	2,65	3,86	2,62	2,51	2,93	2,61	2,33	0,19	0,12	1,73
Rb	1,47	1,28	16,84	3,23	32,46	1,07	0,75	0,72	2,14	1,74	2,41	1,78	1,27	0,72	7,30
Sm	4,14	3,89	1,91	4,94	1,83	2,9	5,61	3,92	3,86	4,35	3,81	2,09	0,2	0,25	1,98
Sr	90,95	49,1	516,5	559,7	747,5	685,6	524,4	612,7	546,5	294,7	507,1	282,8	13,3	20,5	245,62
Ta	0,12	0,12	0,07	0,14	0,07	0,13	0,27	0,1	0,12	0,11	0,12	0,1	0,01	0,02	0,31
Tb	0,57	0,47	0,29	0,67	0,27	0,38	0,92	0,58	0,6	0,67	0,57	0,27	0,05	0,06	0,31
Th	0,12	0,09	0,15	0,26	0,2	0,87	0,12	0,3	0,38	0,2	0,35	0,92	0,03	0	0,33
Tm	0,26	0,23	0,14	0,32	0,12	0,17	0,5	0,28	0,31	0,34	0,28	0,14	0,04	0,05	0,17
U	0,06	0,06	0,08	0,13	0,12	0,41	0,07	0,13	0,14	0,08	0,17	0,35	tr	tr	0,37
V	231,2	382,4	231,1	240,4	250,2	67,65	189,7	209,1	192,4	547,4	172,5	227,1	62,7	101	181,08
Y	17,53	15,56	9,07	21,06	8,49	11,74	31,9	18,33	19,44	22,3	17,85	9,61	2,66	3,24	10,56
Yb	1,69	1,46	0,87	1,95	0,78	1,07	3,26	1,76	1,91	2,13	1,74	0,98	0,23	0,35	1,10
Zr	27,38	25,55	15,14	34,72	18,3	21,31	33,44	23,82	27,9	30,68	23,41	36,34	6,22	6,03	40,20

These characteristics are comparable to those of some basic to ultrabasic Pogwa (Table 1) and Ladanka (Table 2) plutonites highlighted in the Diagorou-Darbani greenstone belt of Niger's Liptako by Soumaila et al. (2016a, 2016b). This suggests that these enclaves come from the plutonites that the pluton ripped out when it was being set up.

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Table 2 : Majors and trace elements analyses of the Ladanka Rocks (Soumaila et al.,2016b)

	Soumaila et al., 2016b												
Rocks	Ultrabasic			Metagabbro massif								Metagabbro lited	
Samples	Fpd-26a	Fpd-26b	Fpd-25	Fpd-31	Fpd-33	Fpd-27	Fpd-28	Fpd-32	Fpd-34	Fpd-35	Fpd-36	Fpd-29	Fpd-30
SiO2	43,92	44,4	48,13	47,85	48,65	48,69	49,38	44,91	49,6	47,78	49,22	48,67	46,5
Al2O3	1,39	1,61	6,58	13,99	16,55	17,62	18,56	14,87	18,1	15,84	15,87	14,05	18,76
Fe2O3	15,05	13,78	10,31	5,65	5,93	4,76	5,83	9,66	4,99	6,94	6,74	6	6,39
MnO	0,17	0,22	0,13	0,12	0,11	0,1	0,11	0,14	0,1	0,12	0,12	0,13	0,11
MgO	24,85	23,36	29,53	12,12	9,42	9,28	9,27	14,14	10,44	10,98	10,87	10,43	9,36
CaO	8,39	12,33	3,68	16,72	15,84	16,72	14,2	11,78	14,92	14,27	13,59	17,71	15,42
Na2O	0,05	-	-	0,57	1,06	0,59	1,19	1,19	0,83	0,61	0,85	0,73	0,49
K2O	-	-	-	-	-	-	-	-	-	-	-	-	-
TiO2	0,19	0,29	0,15	0,16	0,2	0,11	0,12	0,1	0,11	0,14	0,13	0,25	0,13
P2O5	-	-	-	-	-	0,05	-	-	-	-	-	-	0,05
Total	100,03	99,61	100,14	99,55	99,86	99,87	99,78	99,89	99,93	99,01	99,8	99,41	99,9
Ba	10,28	21,57	3,4	110,1	53,43	32,74	31,86	31,56	21,18	15,78	33,82	27,9	10,45
Ce	1,1	1,19	1,81	1,01	0,86	1,73	1,17	0,98	1,14	1,37	1,33	1,93	1,53
Co	109,2	107,3	90,98	41,63	39,01	35,16	39,49	72,21	35,35	53,57	43,91	36,21	44,45
Cr	1332	1647	3179	922	571	810	126	897	382	983	271	647	435
Dy	0,99	1,26	0,77	0,92	0,83	0,73	0,58	0,59	0,51	0,62	0,55	1,16	0,6
Er	0,58	0,71	0,5	0,55	0,54	0,46	0,37	0,36	0,33	0,39	0,35	0,65	0,36
Eu	0,14	0,31	0,13	0,27	0,28	0,23	0,26	0,22	0,22	0,23	0,23	0,4	0,25
Gd	0,89	1,07	0,63	0,73	0,64	0,6	0,48	0,45	0,42	0,51	0,45	1,06	0,47
Hf	0,18	0,21	0,26	0,12	0,12	0,12	0,1	0,11	0,12	0,1	0,09	0,23	0,1
Ho	0,21	0,26	0,17	0,19	0,18	0,16	0,12	0,13	0,12	0,13	0,12	0,24	0,13
La	0,28	0,27	0,64	0,71	0,34	1,87	0,48	0,48	0,47	0,99	0,6	0,77	1,3
Lu	0,09	0,1	0,08	0,08	0,08	0,07	0,06	0,06	0,05	0,06	0,06	0,09	0,06
Nb	0,13	-	0,36	-	-	0,11	-	-	-	-	-		-
Nd	1,68	1,87	1,49	1,34	1,01	1,67	0,99	0,88	0,96	1,38	1,19	2,36	1,43
mg	0,65	0,65	0,76	0,7	0,64	0,68	0,64	0,62	0,7	0,64	0,64	0,66	0,62

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Ni	646	627	1290	235	154	156	137	333	204	199	139	141	113
Pb	-	-	-	-	-	1,95	-	-	-	-	-	-	-
Pr	0,24	0,28	0,3	0,24	0,17	0,39	0,19	0,17	0,18	0,28	0,23	0,41	0,34
Rb	-	-	-	1,51	1,54	1,03	0,87	2,91	-	0,81	1,12	1,09	-
Sm	0,7	0,77	0,5	0,5	0,43	0,44	0,35	0,32	0,31	0,39	0,39	0,85	0,39
Sr	8	11	17	162	166	165	238	149	226	224	196	257	205
Ta	-	-	0,03	-	-	-	-	-	-	-	-	-	-
Tb	0,15	0,19	0,12	0,13	0,12	0,11	0,08	0,08	0,08	0,09	0,08	0,18	0,09
Th	0,07	-	0,05	-	-	0,09	-	-	-	-	-	-	0,24
Tm	0,09	0,11	0,08	0,08	0,08	0,07	0,06	0,05	0,05	0,06	0,06	0,09	0,06
U	0,05	-	-	-	-	0,08	-	-	-	-	-	-	-
V	137	166	111	132	144	129	97	94	92	129	132	153	103
Y	5,43	6,76	4,6	5,39	5,34	4,54	3,36	3,57	3	3,75	3,29	6,23	3,33
Yb	0,58	0,68	0,52	0,52	0,53	0,45	0,37	0,37	0,33	0,38	0,38	0,6	0,38
Zr	3,77	4,19	8,93	2,62	2,78	3,67	2,53	2,89	2,54	2,75	2,29	4,28	2,08

The basic to ultrabasic plutonites of Pogwa and Ladanka correspond to meta-ultrabasites (serpentinites), metapyroxenites, garnet-bearing amphibolites, and massive or locally bedded metagabbros (massive amphibolites) (Soumaila et al., 2016a, 2016b). These plutonites have high levels of MgO, Ni, and Cr, and are depleted in light rare earths (Soumaila et al., 2016a, 2016b). These plutonites were considered to be the plutonic base unit of a N-MORB ocean floor with an oceanic plateau, having been influenced to a greater or lesser extent by an oceanic arc (Soumaila et al., 2016a, 2016b). These rocks result from the fractional crystallization of a magmatic liquid from a mantle source depleted by partial melting cycles at variable rates (ultrabasites: 80%, basics: 20 to 40%) (Soumaila et al., 2016b). Soumaila et al. (2016a, 2016b) have determined the environment and mode of emplacement of basic to ultrabasic plutonites without determining the nature of the magmatic lineage of these rocks.

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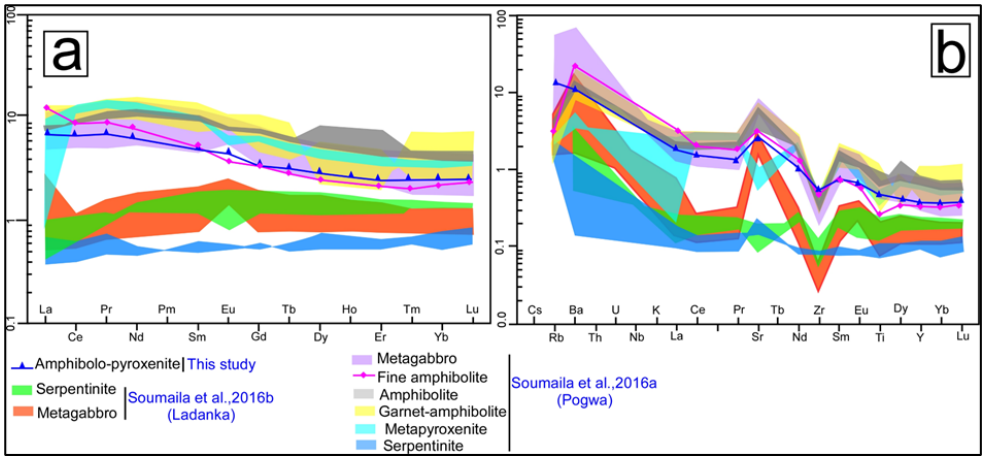

Figure 6: (a) Rare-earth spectra of the amphibolo-pyroxenite enclave and the basic to ultrabasic plutonites normalized to the primitive mantle of McDonough and Sun (1995) ; (b) Multi-element spectra of the amphibolo-pyroxenite enclave and the basic to ultrabasic plutonites normalized to the NMORB of Sun and McDonough (1989)

These basic plutonites to ultrabasites have signatures different from those of most of the tholeiitic and calc-alkaline birimian basites of the West African Craton (Abouchami et al., 1990; Boher et al., 1992). According to the authors, the tholeiitic lineage characterizes an emplacement in a MORB-type oceanic domain (Lompo, 2009), an oceanic shelf area (Pouclet et al., 1996), or an island arc domain (Ama Salah et al., 1996; Soumaila et al., 2004, 2008). The calc-alkaline lineage characterizes an emplacement in a subduction context (Ama Salah et al., 1996; Soumaila et al., 2004, 2008).

The projection of the amphibolo-pyroxenite enclave and the basic to ultrabasic plutonites in the Jensen (1976) (Figure 7) shows that the amphibolo-pyroxenite enclave of the Téra Ayorou pluton and some basic to ultrabasic plutonites of the Diagorou-Darbani greenstone belt fall within the komatite field. This diagram shows that the metapyroxenites, amphibolites, and amphibolo-pyroxenites are komatiitic basalts, while the serpentinites are komatites. This suggests that the amphibolo-pyroxenite enclaves of the Téra-Ayorou pluton and some basic to ultrabasic plutonites of the Diagorou-Darbani greenstone belt constitute a fairly continuous komatiitic line of rocks from peridotites (serpentinites) to basalts (metapyroxenites, amphibolites). This komatiitic lineage is different from the tholeiitic and calc-alkaline lineages with which it is closely intertwined in the field.

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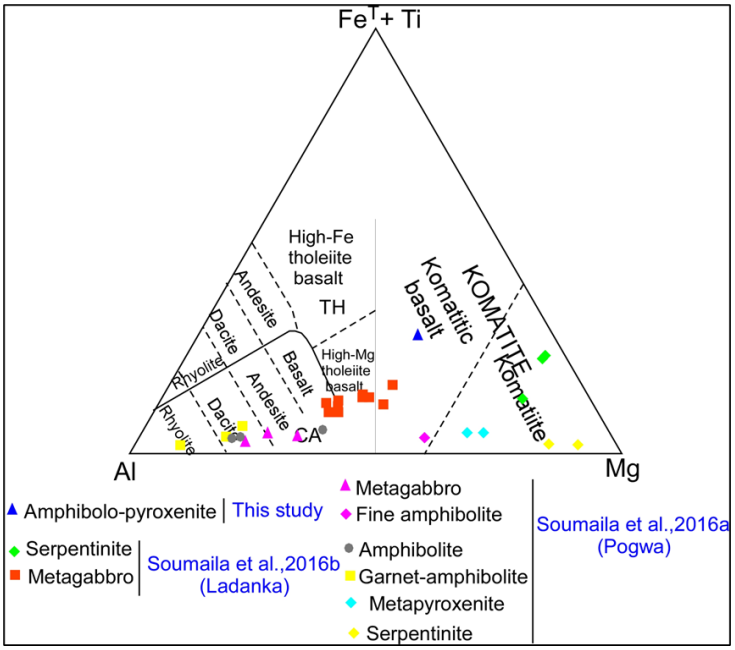

Figure 7: Projection of the amphibolo-pyroxenite enclave of the Téra-Ayorou (this study) and the basic to ultrabasic plutonites of the Diagorou-Darbani belt (Soumaila et al., 2016a, 2016b) in the Jensen (1976) diagram

At the scale of the West African Craton, the basic to ultrabasic enclaves of the Tera-Ayorou pluton are comparable to the mafic to ultramafic Birimian rocks of komatiitic affinity of the Boromo (Burkina-Faso) (Aïfa, 2021), Kotiala-Marbadissa (Ivory Coast) (Doumbia et al., 1998; Pouclet et al., 2006; Aïfa, 2021) and the Niandan belt (Guinea) (Milési et al., 1989; Tegyey and Johan, 1989; Grenholm, 2019). These enclaves of the Tera-Ayorou pluton are also comparable to the mafic to ultramafic rocks of the Paleoproterozoic belt of the Paramaca (Guyana) (Marot and Capdevila, 1980; Milési and Picot, 1995; Capdevila et al., 1999).

Conclusion

The enclaves of amphibolites, pyroxenites, and amphibolo-pyroxenites in the Téra-Ayorou pluton are composed of quartz, plagioclase, pyroxene, and hornblende. These basic rock enclaves are characterized by high levels of MgO, low levels of Na_2O, K_2O and TiO_2, high CaO/Al_2O_3 ratios, depletion of light rare earths, and enrichment in Ni and Cr. These enclaves have a geochemical affinity that is very similar to that of the basic to ultrabasic Pogwa and Ladanka plutonites of the Diagorou-Darbani greenstone belt. This suggests that these enclaves were ripped out by the pluton as it was being emplaced. The amphibolo-pyroxenite enclaves of the Téra-Ayorou pluton and the basic to ultrabasic plutonites of the Diagorou-Darbani

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greenstone belt constitute a fairly continuous komatiitic affinity line of rocks from peridotites (serpentinites) to basalts (metapyroxenites, amphibolites). This komatiitic lineage is thought to result from the fractional crystallization of a magmatic liquid from a mantle source depleted by cycles of partial melting at variable rates.

Conflict of Interest: The authors reported no conflict of interest.

Data Availability: All data are included in the content of the paper.

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The Impact of the EU Engagement in Serbia and Albania During the First Wave of COVID-19

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Abstract

Solidarity is a fundamental value of the European Union, alongside cooperation and competition. The COVID-19 pandemic tested the value of European solidarity; amid this unprecedented crisis, the EU initially failed to determine the most appropriate course of action. This provoked a strong reaction within the European Union and affected the EU's position in the Western Balkans as a soft power.

This paper examined the consequences for Serbia and Albania of the lack of solidarity that characterized the initial surge of the pandemic and the consequences on the integration process. The two countries were selected based on their dissimilar foreign policies. The paper aimed to explain the distinct effects of Russia's and China's foreign policy during the pandemic in Albania and Serbia. The core idea of the research was to evaluate the European intervention and aid during the first phase of the pandemic and the public opinion perception of the EU's role in the two countries.

The study collected the data of the Balkan Barometer surveys conducted in 2020 and 2021. Also, other data from the poll conducted by the International Republican Institute and various official statements and documents from the European Union were included in the study. As a brief conclusion, the study suggested that the EU's role in the two countries during the first phase of the COVID-19 crisis was impacted by national factors like national politics and media narratives and also by the external influence of other actors like Russia and China.

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Keywords: European solidarity, Covid-19, China, Russia, European aid

Introduction

The fundamental values of the European Union, in the words of Delors, are stimulating competition, reinforcing cooperation, and solidarity as a unifying value (Delors, 2020). European solidarity is not only a legal principle but also a component of the EU legal order, as reaffirmed by the European Court of Justice in recent years. This reaffirmation underlines that solidarity requires burden-sharing and a fair distribution of the costs that can result from unforeseen circumstances (European Court of Justice, 2022).

Article 80 of the Treaty on the Functioning of the European Union (TFEU) states that the concept of solidarity and equitable sharing of responsibility shall guide the EU policies on border checks, asylum, and immigration (TFEU, Article 80). Furthermore, member states are constantly urged to share responsibility and respond to humanitarian, financial, social, and economic crises affecting Europe through solidarity-inspired actions (Nicodemi, 2020). European solidarity relies on legal structures, institutions, funding, and programs funded by the EU budget. Over the past two decades, new EU mechanisms have been adopted, like the "Solidarity Clause," the "European Union Solidarity Fund," and the "European Solidarity Corps" that provide social cohesion and promote shared EU values (European Union, 2020). The EU Solidarity Fund includes all the EU states and supports the EU in providing aid to citizens affected by natural catastrophes that might have economic and social implications (EU Solidarity Fund, 2021).

The migration crisis following the Syrian war, as well as a flood of migrants, called into question European solidarity as a fundamental value of the European Union, putting many countries and nations to the test and cracking the EU's legitimacy in the public sphere (Di Napoli, Russo, 2018).

The outbreak of the Covid-19 pandemic in 2020, however, posed the greatest threat to European solidarity. Many EU supporters, among them Delors, voiced apprehension in 2020, amidst the COVID-19 pandemic, regarding the dire consequences that Europe's absence of unity was causing (Chopin, 2024). During the COVID-19 crisis, intra-state and EU solidarity as a general principle guiding EU efforts in numerous fields was questioned, putting the EU's credibility within its territory and its impact in Western Balkans countries to the test.

However, the EU's involvement in the pandemic was constrained, in part, by a shortage of competencies; the health system is a national responsibility; therefore, the EU has merely provided support for health-related competencies and has not allocated direct resources to intervene in an emergency of the nature that Covid-19 generated (Politico, 2020). Despite its lack of direct capabilities, the EU could have engaged indirectly by enabling

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the activation of national solidarity mechanisms, as well as through the European Stability and Growth Pact and the European Union Mechanism of Civil Protection. During the first phase of the emergency, the EU hesitated to activate the Civil Protection Mechanism, and solidarity was invoked only in response to criticism and harsh reactions. The EU didn't demonstrate solidarity toward Italy, the first country severely hit by the pandemic in March 2020. The EU wasn't able to provide immediate medical aid as well as the other countries refused to shoulder the economic costs of recovery.

This lack of cooperation and solidarity caused popular rage, and far-right political organizations like the Lega used it to call into question the EU's very existence and Italy's membership (Christian Balmer, 2020). The far-right's political use of the EU's lack of solidarity and the anti-EU feelings served as a wake-up call to the European Commission. In April 2020, the European Commission apologized to Italy for its lack of solidarity and began to take steps to mitigate the consequences within the EU's borders.

Although the Western Balkans have been comparatively less impacted than other European Union countries, the pandemic presented a significant obstacle to an already precarious healthcare system. It grapples with a scarcity of medical personnel and apparatus, exacerbated by the massive influx of migrants from EU member states. Initially, the EU faced criticism for its role in the Western Balkans due to the ban on exports of medical supplies and the lack of a recovery package for the region. This led to a perception of abandonment, eroded credibility, and increased negative feelings towards the EU in some countries like Serbia, fueling fake news and disinformation (Balmer, 2020). However, the EU later announced its engagement in the region and approved aid packages that expressed the EU's commitment to the region (European Commission, 2020). Following the initial hesitancy, the EU's collective response was outstanding, including health measures, economic measures, research promotion, the battle against disinformation, and strong support for the Western Balkans (Rolof, 2020). Despite challenges and some delays in the integration process the EU's support toward the region during the pandemic aimed to strengthen ties with the region and to contest the impact of other actors in the region like Russia and China. Especially China used the vaccine campaign to gain influence in the region and to revitalize economic ties.

This paper will examine the effects of these actors on the region in the initial phase of the pandemic's transmission, the reactions of the Balkan states (Albania and Serbia in particular) to the European Union's reluctance, the dissemination of false information, and the consequences of the Covid-19 pandemic on the process of integration throughout the two-year health crisis.

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Methods

The principal objective of this research is to evaluate the influence of the European Union's approach throughout the first year of the COVID-19 pandemic in Serbia and Albania, the perception of European sentiments in the two countries, and the impact on the Albanian integration process. This study evaluates the factors and actors that influence European sentiments and the perception and interpretation of aid from other international actors like China and Russia through the interpretation of the Balkan Barometer Polls and other polls conducted in Serbia.

The objective of this research endeavor is to analyze the preliminary actions undertaken by the European Union (EU) in reaction to the pandemic in both countries and the adverse perception of abandonment that arose because of the export ban on medical supplies.

This article used a problem-oriented empirical approach to evaluate how the pandemic situation and the European Union primary contributory role in the region influenced the public's perception of the European Union.

The methodology employed to achieve these goals consists of a review of reports, documents, and literature, with primary sources such as the European Union summit declaration and aid packages declaration, also newspaper and TV declaration of the principal political actors of the region, and polls organized by the Republican International Institute.

Furthermore, the paper incorporates press articles and interviews with key political actors engaged. The paper analyzes Balkan Barometer data in 2020 and 2021 on public support for the integration process to examine the extent to which public opinion was influenced during the pandemic by the mass media in Serbia and Albania.

Results

Following the initial shock of the 2020 pandemic, numerous analysts argued about its geopolitical ramifications, emphasizing the influence that other geopolitical actors would exert in various regions across the globe, including our region of interest, the Western Balkans. Many did not perceive the pandemic as a geopolitical "game-changer" due to its potential to expedite pre-existing trends. However, for others, such a worldwide and pervasive event would undoubtedly usher in a "new normal": a world radically different from the previous.

The reality in the Balkans, especially in Albania and Serbia, has elements of both. The COVID-19 pandemic affected the perception of solidarity within the EU, even in the Western Balkans, and the role of third parties such as China and Russia in the region. However, it did not shift attention away from the accession process. In the words of Ursula von der Leyen, "Solidarity will not be lacking in the area; the EU has a special

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responsibility towards the states whose future lies in the EU" (von der Leyen, 2020). The integration process continued despite the pandemic; the EU granted accession talks with Albania and North Macedonia, and the WB-EU summit was organized remotely in June 2020 under the Croatian Presidency.

The pandemic underscored solidarity and cooperation to address shared challenges. The European Union's response exhibited its dedication to bolstering regional resilience in the face of future crises and assisting the Western Balkans through financial aid and assistance. Together with the European Investment Bank, the EU expressed its solidarity towards the region by declaring on April 29, 2020, an economic package of 3.3 billion euros to contribute to its citizens (European Commission, 2020).

The package provided 38 million euros reallocated from the IPA fund for immediate assistance to the healthcare sector, providing states with the tools to address the problematic situation in hospitals, such as protective clothing, masks, and ventilators (European Commission, 2020).

Furthermore, a portion of the financial assistance was designated to tackle the social and economic issues further aggravated by the pandemic across all regional states. The aid package also sought to address social challenges.

Nevertheless, despite the EU's substantial assistance, some states in the region expressed disapproval due to the EU's prolonged acceptance of the region as a crucial component of Europe. Also, in some states of the region, the EU's failure to prioritize the Western Balkans in its response to the pandemic has damaged its reputation as a soft power.

The reaction can be attributed to the implementation of stringent export restrictions on medical equipment to non-member nations and the requirement for authorization to export protective medical equipment. The ban was consequentially corrected (European Commission, 2020), but these measures were interpreted as indications of neglecting the region, and, as a result, the credibility of the EU was dented during the first months of 2020. (Cameron and Leigh, 2020)

In the countries of the region, there were various reactions. Serbia used sharp rhetoric against the EU in the state media. The EU's initial response to the region during the pandemic and subsequent period of disinformation has incentivized actors such as China and Russia to try and fill the gap through investment and assistance, promoting adverse reporting, false news, and disinformation campaigns. In March 2020, state-run media outlets in Serbia used strong language against the European Union. Specific media organizations disseminated a succession of misinformation to advance a particular political agenda by exploiting the situation; the misinformation emphasized the crisis management capabilities of China and Russia and the EU's lack of solidarity with the region (European External Action Service, 2021). On the contrary, these sources present Russia and China as the sole

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reliable actors during the crisis and saviors who assisted Italy and Serbia while the European Union remained inert.

President Vucic, in a press conference on March 26, dismissed European aid as an elusive notion and asserted the nonexistence of European solidarity (Vucic, 2020). He underscored the significance of bolstering relations with Russia and China, regarding them as regional actors of equal importance to the European Union. (Cameron, 2020). Also, the vaccine diplomacy in Serbia underscored the importance of Serbia's significant contribution to advancing China's vaccine diplomacy and promoting China's positive image in the region. Chinese officials and media have extensively publicized the intended production and distribution of Chinese vaccines in Serbia for COVID-19 (Mujanovic, 2021).

Russia, an additional significant player in the game, maintained an active presence in Serbia and sought to enhance its regional influence. To this end, the Russian Direct Investment Fund funded the Sputnik delivery in the Western Balkans, with Serbia being a particular focus (European External Action Service, 2021). Conversely, Serbia utilized vaccine diplomacy and the involvement of Serbia and China in the subject matter to amass regional influence and bolster its position as a leader in the Western Balkans; the media coverage mirrored the large number of individuals from throughout the region who traveled to Serbia to receive a vaccination. Serbia sought to establish itself as a regional power through this strategy by capitalizing on the COVID-19 crisis and the vaccine controversy. It also endorsed the cooperation and solidarity of China and Russia during the EU's withdrawal. The President's response contradicted the Prime Minister's assertion that the vaccine strategy was a health issue, not a political one; he described the Chinese vaccine distribution as the most crucial intervention in Serbia and attacked the EU and European solidarity (China Global Television Network, 2020).

The pandemic has further solidified that while the European Union has been Serbia's principal supporter for a significant duration, it still needs to make substantial advancements before it is universally acknowledged as the country's preferred partner. In the March 2020 survey of the Western Balkans (excluding Albania), the International Republican Institute discovered that respondents held various opinions regarding their nation's economic relations with other countries. Many Serbian participants cited Russia and China as their principal economic allies, even though the EU is Serbia's biggest investor, trade partner, and donor. (International Republican Institute, 2020). Serbia receives substantial financial assistance from the European Union and ranks among the top three recipients of such aid. However, in 2022, a survey by the International Republican Institute revealed that 30% of respondents believe that China is the country's largest foreign donor, while 38% advocate for the country's foreign policy to be balanced between Russia and the EU

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(International Republican Institute, 2022). In terms of both trade volume and economic transactions, the EU is by far the region's largest and most significant; despite this, the EU's communication campaign during the pandemic was deficient. The poll conducted by the International Republican Institute in 2020 evidenced that during the first months of the pandemic, 39.9% of the Serbians thought that the primary aid against COVID-19 was sent from China, 17.6% from the EU, and 14.6% considered Russia as the principal donor (International Republican Institute, 2020).

It is reasonable to presume that pro-Russian and pro-Chinese media propaganda and the government exert a significant influence over public opinion and that the EU has a problem with visibility in the country, as emphasized during the COVID-19 crisis. Russia and China used the pandemic situation to expand their influence in the region, not only with medical aid but also by beginning a disinformation campaign aimed at discrediting the role of the EU during the crisis (Gaub, 2020).

Furthermore, public sentiment affected the EU's standing as a soft and normative power during the pandemic and influenced its reputation. According to the Balkan Barometer in 2020, only 26% of Serbian respondents believed that EU membership would be positive, while 44% thought it would be neither good nor bad for the country (Balkan Barometer, 2020). The decline of citizen trust in European integration undermines the EU's standing as a regional model, particularly in Serbia. The pandemic allowed China to increase its regional investments, which does not inherently contradict or oppose EU integration. However, the EU's approach in Serbia and the region is undermined by its provision of loans to political leaders without requiring them to adhere to public procurement standards, transparency, accountability, and environmental respect to access funding. Moreover, it diminishes the effectiveness of EU conditionality and aids in consolidating a less democratic regime.

Despite the national propaganda fueled by the authoritarian governance model, EU aid has been consistent and present from the beginning to the end of the emergency in Serbia and the entire region, although less heavily advertised than Chinese aid. The EU granted 93 million euros in March 2020, with 15 million for immediate emergency assistance and 78 million for economic recovery to support jobs and small and medium enterprises (European Commission, 2020). However, despite the presence of solidarity from the EU, the political elite reacted differently. President Vucic, who capitalized on the crisis to promote China and Russia policy and minimize EU aid and efforts, responded on Twitter several weeks after declaring EU aid to the region (Ivkovic, 2020). In this case, the health emergency was used to promote a specific political agenda and increase the influence of Russia and China while minimizing the role of the EU in Serbia. Chinese aid, constantly

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diverging from EU regulations concerning state aid, competition, procurement, and bilateral investment agreements, plays an ever-increasing and consequential role in preserving the authority of governing elites. The Western Balkans, specifically Serbia, have used Chinese assistance to justify domestic measures based on China's authoritarian style and criticize the EU's response (Bieber et al., 2020).

Despite the initial hesitation and the delayed delivery of EU aid to the region because of internal complications, the EU's pivotal position in addressing the crisis in Serbia and the Western Balkans cannot be questioned. The EU launched a 3.3 billion euro financial package rescue for the region, 38 million in funds for the health sector, access to EU instruments and medical equipment, 750 million in micro-financial assistance, and 1.7 billion in preferential loans by the European Investment Bank (Gaub, 2020).

The aid to Serbia was concrete and directed in several directions. Serbia became part of the Rescue stockpile of medical equipment, which was part of the EU Civil Protection Mechanism, a mechanism in which Serbia is part of 2014 together with all the other European countries that have provided urgent assistance to Serbia. Also, Serbia is part of the medical reserve fund created to assist member states facing shortages or needing medical equipment to address emergencies (European Union Delegation in Serbia, 2020).

From March to July 2020, the European Union RescEU stockpile distributed over 20,000 masks, ventilators, tests, and other medical equipment in Serbia as a response to the Serbian request for protective masks to the European Union Civil Protection Mechanism (European Union Delegation in Serbia, 2020).

While the European Union's involvement in the Serbian emergency was not as widely publicized as that of other international actors, it was undeniably more crucial and foundational in the long run, given the economic recovery package implemented in the aftermath of the pandemic. In 2022, the European Union (EU) provided €11,968,276 in non-repayable aid through the EU Solidarity Fund to support emergency operations in the fight against COVID-19 and implement additional health system recovery measures in Serbia as an expression of the EU dedication to support Serbia as a future member of the EU (EU Grant's 12 million to Serbia's Health System for Pandemic Relief, 2022). Furthermore, the EU's ongoing support for the modernization and consolidation of the healthcare sector over the past two decades is of the utmost significance; it has contributed to the health system's strengthening and modernization.

Albanian case

The emergence of COVID-19 in 2020 coincided with a crucial and advantageous phase in the Albanian integration process, as the European Union granted the initiation of accession negotiations after one year and a half.

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Although the pandemic somewhat deflected the integration process, the European Union (EU) maintained its agenda. It extended the WB-EU summit online from May to June, positively signaling the country and the region.
Notwithstanding the favorable phase of the integration process, the COVID-19 pandemic in Albania inflicted severe social, economic, political, and human consequences. In particular, the healthcare system proved precarious and incapable of managing an emergency of this magnitude.

The Albanian government responded to the pandemic with almost immediate, drastic measures of social isolation and declared a state of emergency. The Albanian government deployed the army during the first wave of the pandemic (March–April 2020) to ensure and enforce the curfew measures alongside the police. The government restricted citizens' liberties through normative acts that amended the law on the Prevention of Infectious Diseases, sparking a national discourse on the validity of these restrictions and the risk they posed to democracy and legal institutions amidst the pandemic. (Esch, 2020).

As for the communication strategy, the Prime Minister used social media to describe the situation and raise public awareness of respect for social distancing and the use of masks. Amidst the pandemic, the government received favorable coverage in the national media, while problematic situations received minimal attention. Furthermore, a report on the government's response to the crisis and its institutional and technical capacities still needs to be published.

Regarding aid from the international community, particularly the EU, Turkey was the first nation to offer assistance in the form of masks and ambulances. The Prime Minister's rhetoric frequently underscored the absence of international aid, occasionally accentuating the matter on social media platforms and media: *"We are alone in this fight* (ABC News, 2020).

Nevertheless, the initial absence of European solidarity did not reflect poorly on the EU in Albania; in fact, positive attitudes towards the EU remained unaffected by the EU's decision to withhold aid or to impose a moratorium on the export of medicine in the Western Balkans. Albanians have historically held a favorable attitude towards the European Union and have consistently demonstrated substantial backing for the European integration process. Since the collapse of communism, this has been regarded as Albania's sole option for foreign policy.

When comparing the Balkan Barometer data from 2020, 2021, and 2022, support for the integration process ranges from 80% to 89%. Many Albanians believe the integration process will yield positive outcomes, encompassing health and social systems and economic growth (Balkan Barometer, 2020, 2021, 2022).

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At the end of March 2020, the EU presented a package of assistance to the region, reinstating solidarity as a fundamental value and expanding its strategic role and engagement in every country in the region.

Under the motto "We stand together," EU assistance to Albania was part of the EU's strategy towards the region. The European Union mobilized a package of €410 million in relocating bilateral assistance in April 2020 to assist the area during the emergency. Of this amount, 4 million euros were allocated as immediate support for the health sector in Albania, while the remaining 46.7 million was designated for social and economic recovery (European Commission, 2020). The European Union initiated a social media campaign to educate the most susceptible individuals about appropriate conduct amidst the coronavirus crisis; the social campaign raised awareness of the EU's role in Albania during this period.

The continuity of the integration process was one of the most critical concerns during the initial months of the pandemic. As stated, the EU initiated access negotiations with Albania and Northern Macedonia following repeated delays. The Albanian integration process was not adversely affected by the pandemic; instead, it increased the European Union's solidarity and focus on the region, providing an opportunity to contrast the positions taken by China, Russia, and Turkey.

The pandemic-related situation in the region and the state's economic recovery after the crisis were the main topics of discussion at the Zagreb Summit in May 2020. During this Summit, the European perspective of the region was reconfirmed, and the EU presented its dedication to actively aid its Western Balkan counterparts in their endeavors to mitigate the repercussions of the coronavirus pandemic on economies and societies (European Council, 2020). During the Summit, the European Council boosted its solidarity with the region and presented an economic package of 33 billion euros and 1.5 billion euros as a soft loan from the European Investment Bank (European Council, 2020). This financial package reaffirmed the EU's status as the preeminent actor in the Balkans and the most trusted aid provider to states afflicted by the health crisis.

The Summit was an important event that affirmed the European future of both states, EU solidarity with the region, and the EU's attention to the region during the sanitary crisis. Also, the final declaration of the European Council affirmed the need to fight disinformation from third-state actors and strengthen collaboration on resilience-building and cyber security (European Council, 2020).

Although the Summit confirmed the EU's attention to the region in tackling the economic crisis, it needed further to advance the integration process for North Macedonia and Albania. The pandemic had no impact on the process's agenda, but Bulgaria's veto against Northern Macedonia

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prevented the integration of Albania and Northern Macedonia. In this perspective, the Zagreb Summit did not mention the accession negotiations but referred to the importance of the reforms undertaken by the two states. The Summit was essential to confirm the European future of states and EU solidarity with the region. However, further light needs to be shed on the opening negotiations; Albania opened the negotiations in July 2022.

In November 2020, the European Union authorized a package of 103.3 million euros to assist Albania in addressing the social and economic repercussions of the health crisis and to further the reforms initiated in preparation for EU membership (European Delegation to Albania, 2020). The assistance provided by the EU was welcomed in the media and by political actors, created a positive impact, and confirmed the EU as a significant factor in the country's economic and social development.

The initial lack of EU solidarity in Albania did not affect the perception of the EU's role in the country, and the influence of China and Russia was also negligible. The media refrained from praising the assistance of other international actors, except for Turkey. While China and Russia tried to raise their influence in the region, especially in Serbia, to create new alliances or strengthen existing ones, Turkey operated less for foreign policy and more for domestic reasons. Turkey's assistance to the Western Balkans functioned as a domestic propaganda instrument: customized aid packaging was strategically crafted to amplify Turkey's President's benevolence on an international stage, and the Turkish government's ability to assist its neighboring countries amidst a global pandemic was promoted in the domestic media as an indication of the nation's grit and resilience (Aspen Institute, 2020). During the crisis, Turkey echoed the unique cultural and historical relations with the region, especially with Kosovo, Bosnia, and Albania, considering the role that President Erdogan has tried to take since he came into power, not as an external actor in the region but as a friend, alley, and protector. The President tried to use his relations with Prime Minister Rama to influence the impact of Turkish aid in Albania. "Healthy" tourism from Albania to Turkey also grew consistently during that period. The media illustrated the Turkish assistance, but they acknowledged, by far, the EU aid in the region and the country specifically, and the EU has been able to fight disinformation.

We can safely assume that the Albanian integration process was not delayed due to the pandemic situation and that the aid of other actors like Cina and Turkey did not influence the EU soft power and role in the country. Russia has a minimal impact on the country due to the perception of a close affinity between Serbia and Russia.

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Discussion

The COVID-19 pandemic underscored the critical nature of European Union (EU) solidarity beyond its borders, including in the Western Balkans (WB). It also emphasized the need for enhanced collaboration between European Union member states and external partners, including those in the Western Balkans. The pandemic demonstrated that during crises, the actions of a significant actor such as the EU can have varying outcomes and, as in the case of Serbia, can sometimes diminish the EU's soft power and credibility.
In response, the EU has implemented various measures to bolster public health, foster economic recovery, and increase the region's resilience.

The European Union extended significant financial and logistical assistance to the Western Balkan region to mitigate the economic and health risks posed by the pandemic. Nonetheless, the pandemic revealed a few obstacles in the relationship between the EU and WB, including the necessity for improved communication and coordination between the two regions.

The growing influence of other international actors, such as China and Russia, forced the EU to alter its course of action, making a positive relationship with the region more vital than ever. The European Commission modified its information campaign to emphasize its crucial role as the most stable economic partner in the entire region, with a particular focus on Serbia.

The European Union approved Albania's and Northern Macedonia's accession negotiations in 2020, unaffected by the pandemic. However, the subsequent Bulgarian veto negatively impacted the credibility of the process and the application of conditionality in the region.

The complete ramifications of the COVID-19 pandemic in Albania remain unknown, except for the health sector. The discourse did not analyze the enduring consequences of the pandemic on the European Union relations with the region.

The research was founded upon an extensive compilation of reports and studies conducted by various European and international institutes and organizations, including the European Parliament, the Aspen Institute, the Balkans in Europe Policy Advisory Group (BiEPAG), the Organisation for Economic Co-operation and Devolpment (OECD), and authors such as Gaub, Esch, and Bieber, whose work specifically examined the Covid-19 pandemic in the region. As with the selected nation, the study compares the similarities and differences between Serbia and Albania; however, a more comprehensive view of the region must be considered in the future.

Conclusions

The COVID-19 pandemic has presented Serbia, Albania, and the European Union (EU) with a complex and varied relationship marked by collaboration, obstacles, and divergences of opinion. Amidst the pandemic,

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Serbia has made steady progress towards EU membership. The EU has reaffirmed its dedication to the country's European integration and has urged it to undertake the requisite reforms.

The European Union has granted Serbia financial aid and technical assistance to bolster its healthcare infrastructure, acquire medical supplies, and execute immunization initiatives. However, the EU's assistance to Serbia was tainted by a disinformation campaign, while the media lauded Russia's and China's contributions throughout 2020. The campaign has contributed to a misunderstanding regarding the EU's status as the nation's most dependable and significant partner.

The media campaign capitalized on public sentiment; according to surveys conducted in 2020 and 2021, a significant proportion of the Serb population believed that China and Russia were the primary contributors to the nation's economy. Furthermore, the country's altered pro-EU sentiments impede the effectiveness of EU conditionality and the EU's ability to promote and facilitate the implementation of essential reforms.

Serbia's acquisition of COVID-19 vaccines from non-EU sources, such as Russia and China, has generated controversy and prompted inquiries regarding the nation's compliance with EU policies and benchmarks. Serbia's vaccine procurement strategy has garnered commendation for effectively managing vaccine supplies. However, it indicates the nation's attempt to balance its ambitions to join the European Union and its strategic alliances with other prominent international actors.

The COVID-19 pandemic has introduced nuances and difficulties into the Serbian-EU relationship. However, it has also emphasized the significance of collaboration, communication, and reciprocal assistance in tackling shared obstacles and promoting common goals. During this period, the interaction between Serbia and the European Union demonstrates a complex interplay between geopolitical factors, public health cooperation, and the ongoing European integration process.

The relationship between the European Union and Albania throughout the COVID-19 pandemic was characterized by a positive signal, such as the authorization to begin accession negotiations and the imperative to resolve the health crisis. In addition to assisting the healthcare system, the European Union provided financial assistance to mitigate the socioeconomic repercussions of the crisis.

The summit declaration in Zagreb reaffirmed the European Union's dedication to the Western Balkans and attempted to resolve the region's primary challenges posed by COVID-19.

The substantial public endorsement of the European integration process in 2020 and 2021 indicates that, despite the influence of other actors such as China and Turkey, Albanians regard the EU as their most vital and

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dependable ally. Efforts to strengthen cultural and diplomatic ties, medical assistance, vaccine diplomacy, and economic cooperation comprised most of China's involvement in Albania during the COVID-19 pandemic. Although China's participation in Albania was met with approval from both the government and the public, EU aid was never compared with Chinese aid, and the role of the EU wasn't minimized by the media.

Consequently, the European Union altered its initial course of action in the region, exhibited values of cooperation and solidarity, and played a significant role in the socioeconomic recovery. External actors influence such as China, Russia, and Turkey also compelled and imposed this role. So, the EU changed its course of action after the first initial lack of solidarity but this change was caused due to external actors policy in the region. The differences between Albania and Serbia demonstrate how public opinion is influenced by the national media campaign and national political narratives. Also, we can conclude that the Albanian support of the European integration and EU role is the only course for the country. Albania doesn't have many choices in its foreign policy unlike Serbia which can relate to another ally and use its affinity with Russia to pressure the EU.

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