Environment, Development and Sustainability (2024) 26:21303–21323
https://doi.org/10.1007/s10668-023-03530-4

Environmental and social integration in Tigray's postwar reconstruction

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Received: 23 March 2023 / Accepted: 24 June 2023 / Published online: 5 July 2023

Abstract
Tigray, a small region in northern Ethiopia, has faced serious problems over the last three years. The COVID-19 pandemic-related lockdowns come first, followed by history's longest and most destructive war and siege. The brutal war wiped out millions of people and destroyed Tigray's infrastructure. The Pretoria agreement makes it seem necessary to reconstruct the damaged region. To this effect, proactive strategies are required to integrate environmental and social factors into development projects. Hence, this paper synthesizes the extent of environmental and social integration practices in development initiatives of the pre-war period in Tigray to draw lessons for postwar reconstruction. In this research, the environmental impact assessments of twenty-one multi-sector development projects as well as 2327 project proposals processed for environmental clearance in Tigray were used to analyze legislative promises and performances. According to this study, private and public sector development initiatives had weak commitments compared to projects with external pressure from development aid organizations. This can be attributed to a dearth of regulatory agency expertise, a lackluster legislative foundation, and questionable institutional autonomy. Moreover, the absence of a context-based land use plan, a lack of cluster-based integrated watershed management, and a failure to consider eco-services and cumulative impacts during project appraisal are some of the gaps identified. Therefore, these confronting realities need a proactive solution before any reconstruction efforts are planned in the region.

Keywords Alternative · Cumulative · Genocide · Impacts · War

1 Introduction

Tigray has been the scene of a genocidal war that was declared by a coalition of the governments of Ethiopia and Eritrea, which recruited the aid of Somali forces, Amhara regional special forces and associated militias (Fanos), and special forces from other regional states (Canetti, 2021; Mackintosh, 2021; Plaut et al., 2022). The war, which

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broke out on November 3, 2020, lasted for more than two years and was backed and funded by the United Arab Emirates and other nations (Plaut et al., 2022). Not only had the Tigrian ethnic group been targeted for extermination, but other sociocultural and historical identities, religious sites, and socioeconomic infrastructure were also deliberately destroyed during the war (Brooke-Holland, 2021; Canetti, 2021; Human Rights Watch, 2022; Mackintosh, 2021; Plaut et al., 2022). The aggressors had looted movable private and public properties of the region. They also looted and slaughtered domestic animals and pillaged household items and farm equipment (Canetti, 2021; Mackintosh, 2021), and transported them using the plundered vehicles and equines from Tigray. Lastly, they shot, blasted, and destroyed immovable facilities and infrastructure. Literature in this regard has shown the use of multiple orchestrated tactics by the invaders (Brooke-Holland, 2021; Canetti, 2021; Mackintosh, 2021; Plaut et al., 2022).

Overall, the war ended following the Pretoria accord leaving a disastrous scar on the socioeconomic condition of the region. Thus restoration, reconstruction, and transformation of the region are obligatory tasks at the forefront. However, the reconstruction and redevelopment path should be environmentally friendly and socially acceptable. One tool which is widely accepted is the environmental impact assessment (EIA) (Emberton & Therivel, 2009; Jain, Urban, Balbach, & Webb, 2012; World Bank, 2017) because of its roles in shaping policies, programs, and project decisions (Ebisemiju, 1993). Despite its importance, EIA in developing countries is not as self-initiated as does in the developed world. The EIA in developing countries is being introduced predominately to respond to external pressure mainly from development assistant organizations (Hironaka, 2002; Momtaz, 2019a). Moreover, it has been extremely slow and exhibiting dismally poor performance (Ebisemiju, 1993) despite efforts by practitioners.

EIA is regarded as the forerunner of social impact assessment (SIA) (Momtaz, 2019b), the realm of SIA is also now conceived as the process of managing the social issues of development through analysis, monitoring, and management of the social consequences of planned interventions (Esteves et al., 2012). Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment (IAIA, 2003). SIA remained basically an integral component of EIA and is yet to be as firmly established in environmental planning as EIA, particularly in developing countries (Momtaz, 2019b). Both EIA and SIA are based on an anticipatory approach and are important project planning instruments when applied in the earliest stages (Barrow, 2002; Slootweg et al., 2001). Likewise, the environmental and social management plan (ESMP) is an instrument that details the mitigation measures to be taken during the implementation and operation of a project, the cautions needed to implement these measures, and the procedures for managing non-compliances (ERA, 2013b; World Bank, 2017).

The EIA and SIA approaches are currently accepted as key tools of environmental policy-making to influence critical decision-making. However, successful implementation of the tools and achieving intended outcomes highly depend on understanding local conditions and socioeconomic contexts. In many countries, the EIA is regularly reviewed, and legislation, administrative setup, and ways of practice are modified (Momtaz, 2019a). However, no significant improvement has been made since 2002 in the region and its implementation is not yet studied. Therefore, to start the reconstruction of development projects in the war-torn region, evaluating the past implementation processes of EIA and SIA in Tigray before the war seem relevant to bring prevailing issues to the attention of interested practitioners and decision-makers in the postwar era.

2 Materials and methods

2.1 Study area description

The study area is the national regional state of Tigray, as defined by Federal Negarit Gazeta (1995). Accordingly, Tigray is bordered by Ethiopia to the east and south, Sudan to the west, and Eritrea to the north. Administratively, Tigray is divided into seven administrative zones and 93 districts (Fig. 1). Geographically, it is situated between Easting 213,445 m and 607,155 m and Northing 1,355,036 m and 1,654,729 m.

The data and information used in this study were drawn from a variety of sources detailing project-specific contract documents, stakeholder and public consultations at project levels, studies of individual project's environmental and social impacts. This study included multi-sector development projects spanning from 2010 to 2020, considering the start of the institutionalization of the EIA in 2010 and before the war begins in 2020 in the region. Projects in the region exhibited differences in sizes, nature, funding sources, and objectives. Hence, the purposive sampling method was used to select projects from the different strata. Accordingly, a total of 21 projects were selected including (9) road construction, (5) industry projects, (2) complex agricultural investments, (2) urban master plan development, (1) transport project, (1) earth dam construction project, and (1) sustainable tourism development projects were selected (Fig. 1).

In addition, project proposals processed between 2017, when the EIA study was declared to be executed by a legally licensed consulting firm, and 2020 in Tigray for environmental clearance were selected, and data were extracted and analyzed to establish trends and assess the performances of the main sectors and actors in the region. Data related to project-specific design, mitigation,and management plans were extracted from each project

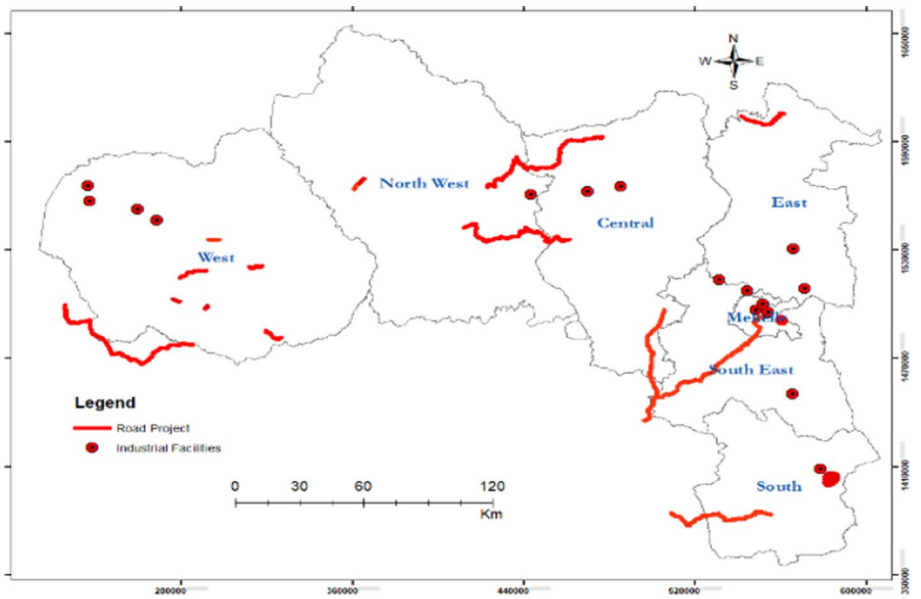

Fig. 1 Locations of the studied projects

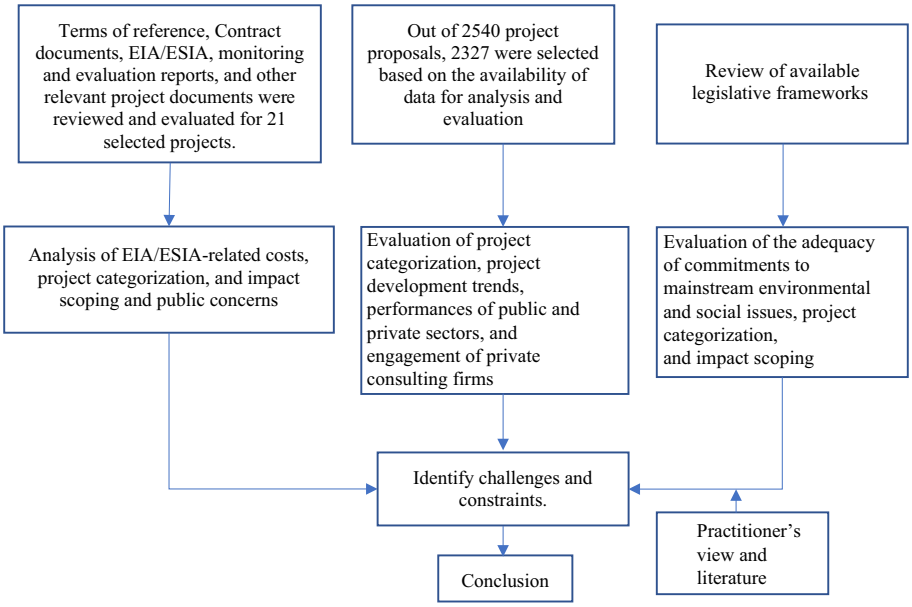

Fig. 2 Description of the study approach

and utilized to triangulate with the data obtained during environmental and social impact assessment (ESIA) and ESMP studies, supervision of construction activities, and compliance auditing of the pertinent projects under investigation. Furthermore, additional imputes from the author's conversations with professionals in the regulation, consulting, and academic fields were considered as illustrated in Fig. 2.

3 Results and discussion

3.1 Environmental and social consideration trends

3.1.1 Enabling legislative frameworks

The literature recognizes ESIA as a viable option for integrated project effect analysis (Dendena & Corsi, 2015). However, administrative and legal structures determine how well it functions (Momtaz, 2019a). For instance, experts argue that determining the cumulative impact is a difficult task that is becoming a challenge and a focus for the legal framework (Smith, 2006). Whatever, the reasons, the concept of EIA has been introduced into the legal systems of many countries (Dendena & Corsi, 2015). In this respect, the provision of the policy, legal, and institutional frameworks is fundamentally an entry point to avoid weakness and put safeguards and sustainability policies on the map. Table 1 lists the ESIA and ESMP policy and legal structures that are currently in effect in Tigray.

The administrative setup is the other factor that has a big impact on how well environmental and social safeguarding instruments are used. According to Ebisemiju (1993), the most pressing problems are the lead agencies' low standing in the bureaucracy, lack

Table 1 Environmental and social safeguard laws in Tigray

Legislation	Provisions
Constitution of Tigray	Laid a foundation to guarantee the rights and the rule of law for all citizens of Tigray (Negarit Gazeta of Tigray, 2006a)
Establishment of Tigray environmental protection agency	By Proclamation No. 77/1996, the Agency was established as an autonomous government agency tasked with harmonizing environmental protection and economic activities (Negarit Gazeta of Tigray, 2004)
Environmental impact assessment	The environmental impact assessment has designated a tool to execute Tigray's environmental laws, rules, and regulations by proclamation No. 200/2003 (Negarit Gazeta of Tigray, 2011a)
Environmental pollution control	Proclamation No. 199/2003 mandates the administration of chemicals, ray-emitting bodies, hazardous materials, and wastes (Negarit Gazeta of Tigray, 2011b)
Regulation on solid waste management	Issued as Regulation 81/2005, it aims to safeguard the public, improve the sanitation and esthetics of urban areas, and promote the recycling of solid wastes into useful resources (Negarit Gazeta of Tigray, 2013)
Solid waste management	The amended proclamation No. 220/2004 was passed to strengthen knowledge and capabilities at all levels to prevent adverse impacts from solid waste disposal and to make use of solid waste to generate assets that are both economically and socially beneficial (Negarit Gazeta of Tigray, 2012)
Regulation for the provision of rural land administration and use	The revised Regulation No.85/2006 addresses rural land use and administration issues in Tigray (Negarit Gazeta Tigray, 2014)
Rural land administration and use	The amended Proclamation No. 239/2006 mandates land and properties situated within the expropriation of landholdings for public use to receive compensation or replacement (Negarit Gazeta of Tigray, 2006b)

of funding, and inadequate availability of qualified personnel and facilities. In this respect, the Tigray environmental protection agency has been in service for more than fifteen years. However, because of its autonomy related problems, it has been unable to effectively impact pertinent decisions and has had trouble in coordinating environmental protection efforts.

The implementation of the laws promulgated as proclamations and the ability of the regulatory body to deliver its services is hampered by the absence of downstream regulations and guidelines. For instance, as shown in Table 1, the only downstream laws in Tigray are related to rural land administration and use, and solid waste management. On the other hand, better instructions and explicit guidelines for compliance were seen during project preparation than during supervision. Overall, more focus has been placed on

the planning and appraisal of newly established projects than the supervision and monitoring during implementation.

3.1.2 Costs of environmental and social considerations

Concerns about the integration of environmental and social considerations into project development have been raised by critics who lament the costs, delays, and bureaucratic processes that obstruct project implementation. In this regard, literature claims that excessive delays are frequently caused by inadequate process administration rather than the process itself (Rogers, Jalal, & Boyd, 2008). The costs of the ESIA study exhibited variations among projects. For instance, based on the size of the project, the expense to prepare an assessment of the environmental and social risks and impacts ranges from one to three percent. Similar estimates were made by Abaza, Bisset, & Sadler (2004) for the capital expense, which ranged from 0.01 to 1 percent. The expense of managing and mitigating its impact on the environment and society is also subject to wide variations. For instance, costs are anticipated to be between 2 and 5 percent of the total project cost (ERA, 2008; FDRE-MWUD, 2008), despite Abaza et al. (2004) providing an estimate of 1 to 15 percent of the capital cost.

All expenses associated with conducting an ESIA studies and ongoing independent monitoring are the proponent's responsibility (Abaza et al., 2004). The government also bears costs related to administering an ESIA system. Experiences demonstrated that there is no evidence that ESIA-related costs have stopped projects or prevented their proponents from implementing them (Abaza et al., 2004; Negarit Gazeta of Tigray, 2011a). However, it must be realized that proposed development projects impose significant costs on the local communities, many of which rely on natural resources for survival (Rogers et al., 2008). In this connection, more compliants have been made due to downstream water pollution from Almeda Textile Factory (Almeda Textile Plc, 2016) and others.

In Tigray, using monetary schemes as a tool to ensure the integration of environmental and social concerns was fraught with challenges. The biggest problem is that most proponents do not see the environment as an integral part of their business and development paths, but rather as a burden. They do it, though, to meet legislative and financial requirements, either to obtain a license or funds. In this regard, noticeable distinctions were observed between the private and public sectors. While the proponents in the private sector are reluctant to allocate sufficient funds, the public sector failed to implement the allocated budget and related actions. The implementation of such a plan has shown a variety of challenges, despite the requirement to present adequate funds to carry out the proposed mitigation measures, monitoring, and capacity-building activities in the ESMP part of the ESIA or separately. For instance, in the private sector, proponents ignore the offer of the proposed budget after they get the intended licenses. In this case, once the permits have been granted, there is less chance for the regulatory agency to have an influence.

In contrast, in the public sector, when a project involves a client and contractor like road projects, considerable funds have been committed as part of the contractual obligations, but most projects do not carry out the plans. The key problem in this regard is safeguarding management costs, which the contractors see as a net profit in the absence of payment modalities. On the other hand, when payment modalities are linked to safeguarding management, they perceive those costs as losses from the project's economic

benefits. Some legislative obligations supporting the preservation, replacement, and rehabilitation of trees in Tigray are available. For instance, any agricultural investment is required to preserve at least 40 existing or plant trees per hectare of investment land (Negarit Gazeta Tigray, 2014). Similarly, in road work, preserving at least 10 new indigenous seedling species for each indigenous tree removed and providing them with the necessary care until they can grow independently is a requirement (ERA, 2013b). However, it is incredibly difficult to find projects that meet the aforementioned requirements, largely because of the proponents' reluctant and narrow mindset along with the poor post-environmental impact statement execution and monitoring of mitigation measures.

The other impressive challenge linked with using monetary schemes as a safeguard tool in infrastructure development projects is weak resource planning and associated financial incentives for poor environmental and social performances. Carting away excavated materials of satisfactory quality and restocking with material from other sources of relatively inferior quality to increase the volume of work items, such as construction works in Baeker Integrated Agro-Industrial Parks (IAIP) is an example of this situation. Financially driven non-value-added activities include excessive excavation at the work site and the material sources, as well as the disposal of the bulk of materials at other sites.

3.1.3 Project categorization practices

The first stage in an environmental and social consideration study is screening, which involves categorizing projects according to their environmental and social sensitivity (World Bank, 2017). It is conducted during the project concept stage to determine whether a proposal needs an ESIA and define the level of the assessment (EEPA, 2003a; ERA, 2008). Although screening is a widely used method for classifying projects, there are differences in how projects are categorized. Projects, for instance, are categorized by the World Bank as High Risk, Substantial Risk, Moderate Risk, or Low Risk and in Tigray as schedule I, II, or III. Because many diverse projects are proposed in numerous and varied environmental settings, the procedures to be followed in project screening are not simple. Therefore, it is essential to create contextualized environmental and social screening criteria in order to avoid the risks that have been embedded into the current project classification system.

As a result, there has been a tendency for over-categorization (upward classification) of projects that probably fall within schedule II to I to avoid risks in the case of multi-funded projects. On the contrary, unclear procedure for local projects was observed, which provided a window of opportunity for under-classifying projects. The worst form of environmental and social negligence, even though the effects are distinct, is the incorrect categorization of a project. Over-categorization results in higher preparation costs for the proponent, whereas under-categorization ignores social and environmental consequences.

Project screening and categorization methods in Tigray were found insufficient, especially for projects whose cumulative impacts are important. Similar findings were also reported in the literature (Pavlickova & Vyskupova, 2015). For instance, government policies, strategies, and programs are obligated to be screened (Negarit Gazeta of Tigray, 2011a), but nothing is being practiced on the ground. Some of the real evidence of this gap can be found in Tigray's self-supporting housing programs, road projects in zonal cities, master plan preparations, and other public projects. The extent to which

social risks affect project categorization ratings is also not clearly defined or taken into consideration. Hence, this calls for an effective project categorization system that adapts based on social and environmental risk.

3.1.4 Project development trends

The preparation of EIA reports for outside funding and private investment continues to dominate EIA practice in Tigray, where environmental impact statement (EIS) is a requirement to obtain funds and environmental permits but not for public proponents. For instance, TEPA and its district delegates approved more than 2540 project proposals between July 2017 and June 2020, containing 53% of schedule I and 47% of schedule II (TEPA, 2021). The study reports for schedules I and II were the environmental impact assessment (EIA) and environmental management plan (EMP), respectively (Fig. 3).

The number of schedule II proposals bounced back in 2018–2019, while the schedule I proposals increased steadily during the same period (Fig. 3). The bounce-back effect is due to the delegation of project districts to grant the license for schedule II projects. Ethnic discrimination and its push impact on Tigrians in Ethiopia have been cited for the steady rise in proposals. Because all projects were licensed by TEPA, but it was the project districts' mandate, more EMP proposals have been reported in 2019–2020.

The project categorization and subsequent selection of the suitable safeguard tool have been found to be hampered by the lack of EIA regulations and guidelines to execute the EIA proclamation. Moreover, improvements in road infrastructure have made it possible for the expansion of a growing number of projects to be expanded outside of Tigray's main cities in the remote rural areas with low capacities. For instance, 53.2% of the 1797 project proposals approved in 2017–2020 were found in rural districts (Fig. 4). The mining and quarrying (20.8%), agribusiness (14.7%), and food processing (13.4%) sectors were identified as having the highest frequency of approved proposals. The number of projects approved over the past three years has declined in the mining and quarrying, construction, food processing, agribusiness, and other sectors, while it has steadily increased for the leather, textile, plastic, chemical, and industrial sectors (Fig. 5).

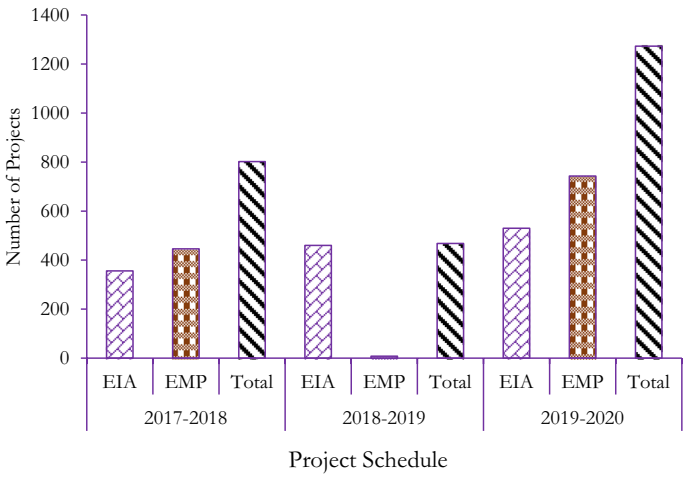

Fig. 3 Proposed projects by category

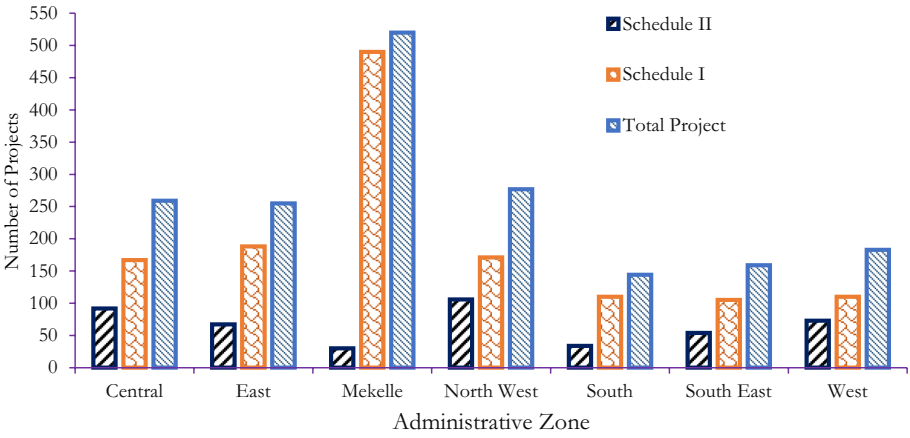

Fig. 4 Spatial distribution of project proposals licensed in 2017–2020

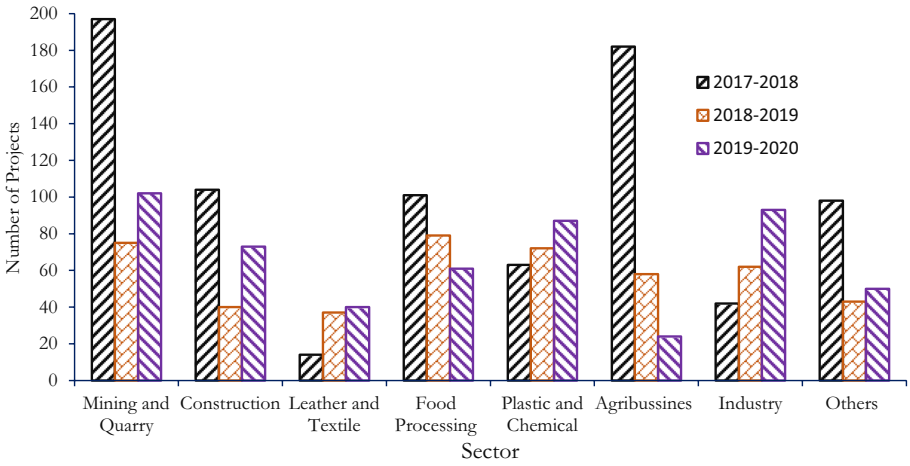

Fig. 5 Licensed project proposals by sector (2017–2020)

Similarly, mines and quarries were the most frequent (Fig. 5) and significant land consumers (Table 2). Of the total land permitted for mining and quarrying, the largest proportion was found in the northwest (90.8%) and southeastern (5.4%) zones. Although it is crucial to understand why mining and quarrying projects have increased at a faster rate than other sectors, it was found as a major land consumer and polluter with very poor rehabilitation efforts. Success in addressing environmental and social problems depends not only on the undertaking of safeguard assessment processes but also strongly on checks and balances. In this regard, from 2017 to 2020, approximately 2.11% of proposed projects were claimed for environmental and social noncompliance.

Table 2 Project Proposals licensed in Tigray (2017–2020)

Administrative zone	Mining and quarry sector						Total all sector projects by schedule		
	Number of projects by schedule			Area (ha) by schedule					
	I	II	Total	I	II	Total	I	II	Total
Central	52	23	75	461	578.5	1039.6	167	92	259
East	68	5	73	508.2	17.2	525.4	188	67	255
Mekelle	8	1	9	80.8	11.9	92.7	490	30	520
North West	29	11	40	754.9	42,823.5	43,578.4	171	106	277
South	16	6	22	82.2	22.4	104.6	110	34	144
South East	74	16	90	2458.7	137.9	2596.5	105	54	159
Western	11	1	12	65.8	0.7	66.5	110	73	183
Tigray	260	63	323	4411.5	43,592.2	48,003.7	1341	456	1797

Source: Extracted and compiled from TEPA (2021)

The main concerns were land use conflicts (47.4%), inter-industry pollution (39.5%), and failure to comply with ESIA and ESMP requirements (13.2%), and the decisions made on those projects comprised rejection (39.5%), relocation (34.2%), written warning (13.2%), and reduction of proposed land (5.3%).

3.1.5 Performance of the public sector

Out of the total 1797 proposals (Table 2), 85.4% were private investments, while 14.6% were publicly funded projects by the World Bank and the regional government under the urban local government development projects (95.4 percent), and agricultural growth programs (4.6 percent). The public sector, promoted by government agencies, was the major investor in Tigray. However, no projects funded by the government of Tigray and the downstream bureaus were proposed for environmental and social approvals. This shows the weakness of commitments vis-à-vis private and development aid agencies-funded projects to integrate safeguard issues.

The debate is why not self-financed public projects? It is not because these projects are environmentally friendly. However, it demonstrates that the government is considering social and environmental issues to meet donor requirements to receive funding, not out of a genuine desire to ensure sustainable socioeconomic development. This became apparent when the policies, strategies, and initiatives that were self-financed got approval without a thorough examination of their social and environmental consequences. Similarly, insufficient institutional arrangements, poor knowledge, insufficient mitigation measure implementation, and deficiencies in wider contextual factors have all been cited for EIA gaps in developing countries, according to Momtaz (2019a).

3.1.6 Engagement and performance of private consultants

Among the 530 project proposals submitted for EIS and EMP approval between July 2019 and June 2020 (TEPA, 2021), 14 private consultants coded here between C1 and C14 were

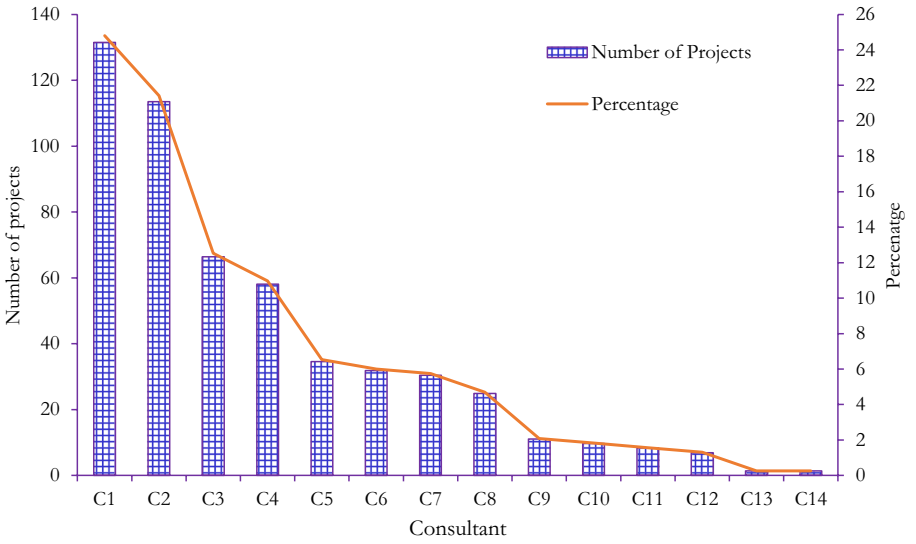

Fig. 6 Private consultants involved in EIA and EMP studies

found involved in the EIA and EMP studies. Discriminatory variations were observed among consultants in terms of participation in such studies. Surprisingly, 14.3% of consultants studied more than 46.2% of the projects, while 85.7% of them studied 53.8% (Fig. 6).

The argument is the capacity of a consultant with very limited resources to handle on average more than 7.5 project proposals within a month. This could severely affect the quality of the EIA study and, most importantly, the contribution of the work to the improvement of the proposed project and the provision of inputs for decision-making. This can affect trust in the processes and their importance, and it seems to discourage other professionals from joining the sector. Given the experiences Tigray had, it will be difficult to manage projects with stringent safeguard requirements if they are not corrected before any postwar reconstruction efforts start.

3.1.7 Trends in considering social safeguards in development projects in Tigray

Despite the SIA's inception, it has long been thought of as an EIA-subordinate component. The ESIA was introduced in response to criticisms of the EIA's approach to addressing social problems, and it is now widely used by international organizations and funding institutions (Dendena & Corsi, 2015). Today, SIA has emerged as an integrated perspective where environmental and social matters are equally recognized and assessed (Equator Principles, 2013; Esteves et al., 2012).

Social impacts, as defined by Eccleston (2011), are any alteration to how people live, work, play, interact with one another, organize to satisfy their needs, and generally function within society. Therefore, SIA is the process of assessing and managing the consequences of development projects, policies, and decisions on people (Momtaz, 2019b). However, SIA continues to be unsatisfactory and has lately gained prominence on a global scale. Abaza et al. (2004), for instance, asserted that overlooking social impacts has resulted in substantial additional and unanticipated costs that, if taken into consideration, might have altered the initial decision on the project's viability. In this respect, after eight years, severe

land degradation, soil pollution in wastewater-irrigated areas, and water pollution in a natural stream that extends for about six kilometers downstream of a textile factory effluent were discovered (Almeda Textile Plc, 2016). This has affected about 69 households who used the untreated wastewater to irrigate their lands. In addition, the stream water has been unfit for its instream and abstraction uses.

The implementation of mitigation measures, such as monetary compensation, has been significantly hampered by the absence of defined policy and legal frameworks on social impact management. As an illustration, in Tigray monetary compensation for expropriated land is calculated based on 15 years of crop production. Land, on the other hand, must be considered a very scarce resource and a permanent asset serving across generations. The problem arises when land is expropriated in the name of compensation without plans for helping affected people restore their means of livelihood. Furthermore, inadequate implementation follow-up and monitoring of mitigation measures and commitments have adversely affected compensation processes. A more severe situation occurs when landlords expropriate their lands through multiple projects or when their available land is situated within the proposed boundary, which leads to landlessness. This is because subsistence agriculture is the primary means of livelihood for rural residents in Tigray. For instance, a study on 96 households impacted by one of the case projects revealed that 71% rely on rain-fed agriculture.

The absence of an assistance scheme to restore the livelihood and obstructed services of affected people is one of the most prominent issues with monetary compensation. For instance, after four years, it was discovered that none of the 96 project-affected households had money equivalent to the amount they received from the compensation (Elfu, 2019). Surprisingly, 90% of them have spent money on non-income-generating activities to satisfy short-term needs. The provision of employment opportunities with priority to project-affected people is the most expressed mechanism to mitigate the expropriation of land and income losses. However, most households lack productive family members who meet the minimum job criteria. For instance, only six individuals from the 96 project-affected households mentioned above and who had a total family size of 520 were qualified for employment within the project. Therefore, gaps in the legislative aspect of providing restoration assistance and support to project-affected people are indispensable challenges in Tigray. Moreover, SIA is not recognized as a distinct procedure by any laws or procedural rules. As a result, there are deficiencies in setting criteria to assess the most important aspects of an SIA system.

3.1.8 Main impacts and concerns

From the approved ESIA study reports of the investigated projects, 18 impacts were found with higher frequencies which are used to compare the four sectors (Table 3). Accordingly, while more of the concerns are rated as having high impact significance for roads (94.7%t), agriculture (84.2%), and industry (89.5%), 52.6% of them are rated as having low impact significance for an urban master plan. Thus, the concerns can be considered generic impacts for road, industry, and agriculture projects, but less likely impacts for urban master plans.

Table 3 Simplified matrix rating of environmental and social concerns of selected sectors

Concern	Projects by sector, more than two projects were investigated			
	Road	Agriculture	Industry	Master plan
Weak ESIA and ESMP integration	H	H	H	H
Drainage and erosion	H	H	H	H
Poor stakeholder and public engagement	H	H	H	H
Inadequate supervision and monitoring	H	H	H	L
Pressure on local resources and public utilities	H	H	H	L
Design, planning, and operational problems	H	H	H	H
Poor infrastructures integration	H	L	L	H
Waste generation and disposal	H	L	H	L
Expropriation of land and related issues	H	H	H	H
Labor, working conditions, and gender mainstreaming	H	H	H	L
Environmental pollution (dust, noise, and/or vibration)	H	H	H	L
Impacts on water resources (pollution and/or abstraction)	H	H	H	L
Ecological and landscape disturbances (slope instability, flora, and fauna, loss of habitats)	H	H	H	H
Displacement and resettlement issues (rural/urban)	H	H	H	H
Access obstruction and severance effects	H	H	H	L
Chemical hazards (Agrochemicals, used oil and spillage, hazard materials, or industrial chemicals)	H	H	H	L
Risk of introducing exotic species	L	H	L	L
Cumulative and residual impacts	H	H	H	H

Source: Identified during the EIA study of 18 projects including g road work (9), agricultural investment (2), industry (5), and urban master plan preparation (2)

Impact significance (H—high, M—medium, and L—low)

3.2 Challenges related to environmental and social consideration

3.2.1 Policy frame work on inclusion of social dimensions

Attempts to integrate environmental and social concerns into development projects in Tigray differ between sectors and within a sector attributed to the funding agency's requirements. In light of this, it is not astonishing that private project proponents in Tigray are more willing to invest in profitable projects and highly reluctant to invest in environmental and social safeguards, which is one of the major drivers to have counterbalanced legal requirements. This is primarily due to the lack of regulatory strong support required to coordinate and calibrate the sensitivity and commitment of various players to important social dimensions. Safeguards and sustainability issues are important international funding criteria and legal requirements for compliance. Thus, it is extremely vital to ensure the presence of legal frameworks dedicated to the integration of social concerns in all aspects of project development with more explicit downstream guidelines and regulations.

On the other side, resources become scarce while the competition for them grows and increases in value, this is where the real conflicts appear to lie because of inequalities in current and future resource endowments (Rogers et al., 2008). Thus, effective resource

allocation among competing uses is unresolved problem in Tigray. Hence, a policy guideline is required not only due to the global social requirements but also due to the direct sensation of impacts in the last two development decades. The greedy interest seen from previous project experiences in the region to maximize the benefits of investments without hesitation seems to deny future generations a secure life and a safe environment. Therefore, there must be a law that protects the more vulnerable people with weak livelihoods and ensures optimized allocation and conservation of natural resources while maintaining accelerated reconstruction efforts in the region.

3.2.2 Integration of environmental and social concerns in project development stages

There is no debate on the need for the consideration of SIA in project development to avoid or minimize social issues. However, a difference exists in whether to consider along with environmental impacts or as a standalone (Barrow, 2002). The choice of a standalone approach also applies to the EIA and its integration into general project evaluation. Because it has been stated that the structural weakness in the current EIA procedures is the separation of planning and design from environmental and social assessment activities (McDonald & Brown, 1995). Literature suggested effective incorporation of the instruments can be achieved if they are fully internalized elements of the planning process (Ebisemiju, 1993). With this, it is possible to maximize benefits and reconsider how community, environmental, and social problems are incorporated into planning by integrating environmental and social considerations into all project phases. Lack of standardization approach and inadequate funding is the apparent weakness of SIA compared with EIA (Barrow, 2002).

Environmental and social consideration tools were observed to be relatively influential in projects with predefined frameworks like the road and world bank funded projects. However, a proactive approach is required to ensure the inclusion of these requirements in all contract documents. An illustrative case was found for the Baeker IAIP, where comprehensive environmental and social impact assessments (TIPDC, 2018) and resettlement action plans (TIDPC, 2017) studies were conducted. Nevertheless, it was impossible to implement these studies during the construction of the project mainly due to the failure to include the instruments in the construction contracts.

Weak integration of safeguard concerns into project phases at the appropriate time was also observed when environmental and social concerns mainly related to wastewater pollution and downstream negative externalities were delayed. Similarly, weak public and stakeholder consultation has resulted in the selection of an undesirable route for the Rama-Chila-Adidaero-Semema road (Nomy Engineering Plc, 2019) and the Zalambesa-Alitena road (Elfu, 2020), where complaints arose during the construction of the road projects. Therefore, close integration of safeguard concerns with the project's economic, financial, institutional, social, and technical analyses is required, as recommended by World Bank (2017).

It can be thought of as effective and unique to handle environmental and social concerns at the earliest possible stage to identify and minimize foreseeable impacts. This demands the integration of safeguard aspects with other key business functions, such as reporting lines and the engagement of senior management (IFC, 2017). However, this was observed as weak in the majority of the investigated projects though highly manifested in public projects initiated by the local government. The consideration of alternative project development as a mandatory requirement is another crucial factor. While

ERA (2013a) mandates that at least three alternative route alignments be taken into consideration for new roads, there is no explicit demand for other projects in Tigray. Hence, it is required to have a law that obligates alternative development proposals for a given project with clear policy guidelines to help proponents find alternative solutions to identified environmental problems without altering the project concepts.

However, it is accepted that the environmental and social assessment needs to be carried out at the inception of a proposed action when there is still a real choice between alternative courses of action, such as alternative sites, designs, feasible strategies of action, and technologies for aspects of the project, as well as the alternative to doing nothing. EIA systems in developing countries are criticized for undertaking environmental and social assessments at the latest project planning stage as a separate technical exercise divorced from the technical and economic aspects of project planning and design, which gives no opportunity to consider alternatives (Ebisemiju, 1993). Alternative options are identified and evaluated in terms of their preference for the community, viability, and comparative impacts concerning the proposal (IAIA, 2003). The significance of early consideration of ESIA is to identify potential alternatives that could accomplish the same results with a different set of environmental effects. Thus, acceptance of the environmental and social assessment shall not be a mechanism for approval but rather for ensuring effective monitoring, mitigation of problems, and responsive management, as also described by Barrow (2002).

3.2.3 Lack of cumulative impacts assessment system

Little attention has been given to cumulative impact assessment (CIA) practices in Tigray. This is linked to the inherent limitation of EIA in coping with cumulative impacts as it focuses on a limited range of project activities (McDonald & Brown, 1995; Zhao et al., 2012). The consideration of cumulative impact assessment while conducting project-level EIA is a widely accepted norm, as it reveals the real magnitude of impacts and thereby may lead to adequate mitigation and monitoring measures (Momtaz, 2019b). Literature recognizes the difficulty of addressing issues in the ESIA of an individual proposal that involve potential cumulative effects on other past, present, and reasonably foreseeable activities that are proximate in time and space (Abaza et al., 2004; World Bank, 2017). Cumulative impacts can result from individually minor but collectively significant actions or a major new development combined with similar or unrelated activities taking place over a certain period (Eccleston, 2011; Rogers et al., 2008).

As a consequence of the direct or indirect effects of numerous activities at various locations or successive activities on the same site, cumulative impacts can be additive or synergistic (Zhao et al., 2012). Impacts can have an additive effect when the magnitude of combined effects is equal to the sum of individual effects, and synergistic effects when effects are combined (Eccleston, 2011). The result in the latter case may be substantially greater (synergistic) or less (antagonistic) than that expected based on additivity. Synergistic effects are usually much more complex and difficult to assess than additive effects. Therefore, even though an impact is insignificant when project impacts are evaluated at individual levels, the combined effect of impacts contributed by other neighboring activities could entail an adverse impact.

Cumulative impact assessment is considered an essential tool to facilitate sound environmental planning and management, particularly when development activities have an individually minor but collectively significant impact on the environment (Zhao et al.,

2012). When only project-specific impacts are assessed, significant cumulative impacts may be overlooked. Attempts have been made to consider the anticipated impacts of a proposed project through the review of the EIA and EMP. However, the cumulative impacts of neighboring activities in the influence area have been surprisingly ignored in Tigray. This is attributed to a substantial gap in legislative obligations. The issue is visible when the environmental and social performances of decentralized projects such as quarry and gravel crusher plants operate proximally to each other, which is common in most districts in Tigray. For instance, of the 96 quarry and gravel crusher plants licensed as schedule II in the Enderta district, 25 are located in the same Tabia A'arato. Similarly, despite the weak enforcement, the safe use and handling of chemicals such as pesticides and herbicides have been declared for investors in the agriculture sector (Negarit Gazeta Tigray, 2014). However, this law does not address the use of such chemicals by non-investors. Consequently, the decentralized use of agrochemicals by individual farmers in Tigray is not regulated and has resulted in severe unintended impacts on the neighborhood apiculture.

Likewise, licensing individual water-intensive investments in a similar watershed will have devastating cumulative impacts on the water table that could lead to the exhaustion of the available water unless effective allocation, conservation, and recharge strategies are in place. Therefore, a collective rehabilitation strategy at the catchment level and optimal use of water at the project level are required to ensure a sustainable supply of water and to sustain the business activity without jeopardizing long-term resource security. As obligated by MoWR (2001), water allocation plans shall be developed based on the basin, sub-basin, and other hydrological boundaries, and appropriate watershed management techniques shall be in place. Nevertheless, failure to implement integrated watershed management methods with due attention to cumulative impacts is a significant flaw in the current environmental and social impact management practices. The most remarkable aspect of this concern is found in areas where irrigation projects evaluated at individual bases are concentrated within a single catchment (reservoir aquifer), where multiple water withdrawals from the same aquifer exist. The concurrent water withdrawal without coordinated rehabilitation efforts could lead to a situation where water availability is uncertain.

The lack of a watershed-based plan for resource conservation that incorporates improved water use, aquifer recharge, and reduced water demands is a critical aspect of the problem. A striking instance of this situation is the case in Raya Valley, where several water-using activities are proposed on the same watershed and the demand for each activity is determined based on activity-driven demands without taking into account the negative effects on the water capital contributed by other existing and upcoming activities. For instance, the Relief Society of Tigray has implemented irrigation initiatives with a total of 45 boreholes in the Raya Valley since 2003 (WWDSE-CECE, 2007).

The number of boreholes drilled for irrigation and water supply has grown recently. In this regard, between July 2015 and June 2018, about 100 water wells were dug (Fig. 7). The only restriction placed on the water wells' licensing was a minimal 500-m separation between nearby shallow and deep wells (TBWR, 2020). Additionally, it is challenging to assess the cumulative impacts based on the environmental and social management plans developed individually. Establishing an integrated water resources management system at the catchment level and enforcing planning, monitoring, and auditing requirements that include a maximum water withdrawal and a minimal recharge to make up for the abstracted water are thus not only necessary but also alarming. This reduces the risk of the investment in the area completely collapsing due to the depletion of the available water capital.

Regarding cumulative impact, there is yet another startling gap when it comes to the combined pollution effects of water resulting from numerous activities that render it unfit

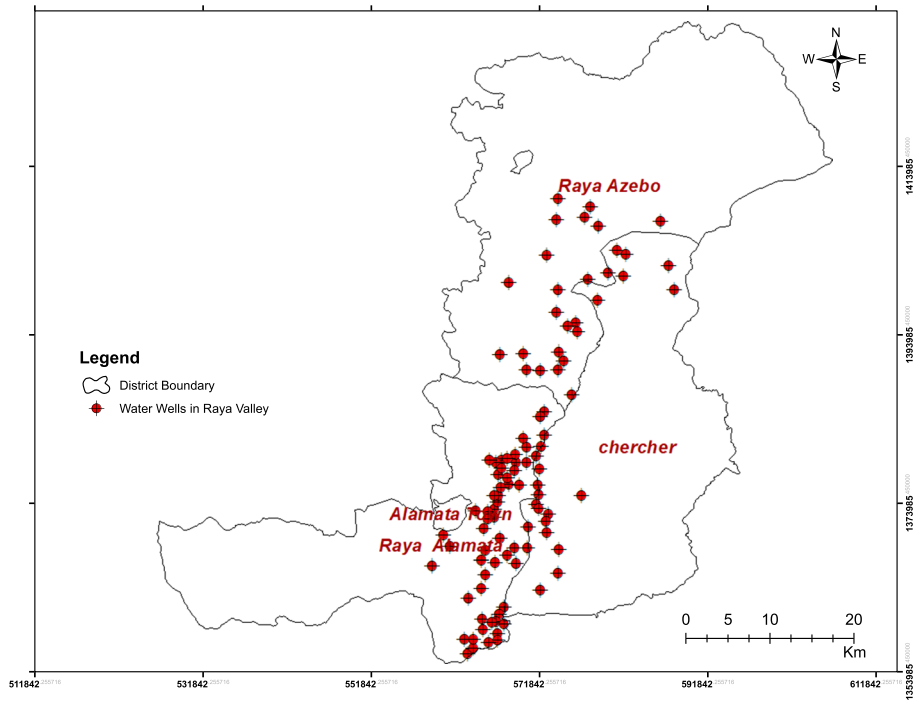

Fig. 7 Location of water wells drilled between July 2015 and June 2018 in the Raya Valley, Tigray, Ethiopia

for its intended and current uses. This has primarily been observed in Tigray's urban and peri-urban outlying areas, where waste from activities permitted based on individual effects on the upstream exceeds the assimilative capacity of a downstream river. It is crucial to establish the proposed activity's impact scale and scope (spatial and temporal boundaries). The problem, though, is figuring out how to consider the proposed activity's attributable effects because the current legal framework takes into consideration the isolated levels of pollution at each facility's outlet point as stated in EEPA (2003b).

The available standard failed to define the spatiotemporal boundaries of an activity's effluents that flow to a natural stream where other contributing activities exist, beyond which the effects of the action have dissipated to levels of insignificant state, and the trade-off among the contributing activities differing in a scale of influence and time of establishment. This requires an account of the ecological realities in such conditions and the establishment of specific thresholds of change against which specific actions may be compared (Eccleston, 2011). When using a threshold, it is important to consider the carrying capacity to avoid irreversible repercussions. It is crucial to require cumulative impact analysis through appropriate laws to take into account an action's incremental effects and the thresholds needed to assess the combined impacts of all actions within the influence area. As also suggested by Zhao et al. (2012), this requires a suitable legal framework and explicit procedure to assess the adequacy of substantive cumulative impact analysis.

3.2.4 Feeble land use planning and watershed-based development strategies

Environmental impact assessment of specific proposals often requires locating them temporally and spatially relative to those receiving environmental components (McDonald & Brown, 1995). Additionally, the proposal must be related to existing regional plans and strategies and include an accurate analysis of the area's capacity to support the proposed activity or determine whether it is already industrially stressed. The lack of a suitable land use plan, followed by a cluster of incompatible activities that sparked complaints due to inter-pollution, was two main reasons for the rejection project proposals. In addition, it has been observed that sectoral development programs have been loosely harmonized with each other. For instance, urban development plans and quarry operations were performed with less attention paid to the effects on agricultural lands and downstream water resources. In this regard, Tigray's urbanization initiatives have irreversibly turned productive agricultural lands into urban settlements and have been dumping indiscriminate amounts of liquid and solid waste into the waterways in upstream. Hence, a real demand for the integration of EIA into land use planning is a timely requirement to solve environmental and social issues that cannot be addressed on a project-by-project basis. A comprehensive development plan that integrates upstream activities with current and emerging downstream activities is also imperative to ensuring sustainable and coherent development outcomes.

4 Conclusion

Environmental impact assessments have been used in Tigray for a decade as a tool to integrate environmental and social concerns into development projects. However, among other things, deficiencies in the institutional, procedural, administrative, and legislative structures have been linked to subpar performances. Compared to domestic projects, programs with external influences from financial institutions received better commitments. In addition, procedures are heavily frontloaded with mandatory requirements for environmental clearance either to obtain legal permits or funds for the project than monitoring and evaluation. EIA has been treated as a standalone exercise divorced from the planning and design aspects of a project. However, because it was carried out after key technical and economic decisions, it was ineffective in producing meaningful results.

Furthermore, the integration of social concerns into development projects, either as an integral component of EIA or as a standalone, is very flimsy and premature. Therefore, early integration of social and environmental concerns into project planning remains one of the major challenges in developing countries like Tigray in promoting sustainable development. Finally, there are more obstacles to the development of an enabling environment for successful EIA implementation, including the regulatory body's capacities and abilities to enforce and oversee compliance. Hence, any planned reconstruction projects in the region should consider the identified gaps to better implement projects in a way that is environmentally viable, socially acceptable, and sustainable. Further study is also required to evaluate the quality of the environmental impact statements and the effectiveness of proposed mitigation measures in Tigray to change and improve the EIA processes.

Acknowledgements The data used in this paper was collected during the safeguard studies, design, and supervision of the respective project. The costs were covered by the project proponents as part of those works. Therefore, the authors would like to acknowledge the project owners for allowing them to work on those projects.

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