

Science for Sustainable Societies

Isabel B. Franco
Tathagata Chatterji
Ellen Derbyshire
James Tracey *Editors*

Actioning the Global Goals for Local Impact

Towards Sustainability Science, Policy,
Education and Practice



 Springer

Science for Sustainable Societies

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The overall goal of the series is to contribute to the development of sustainability science and to its promotion at research institutions worldwide, with a view to furthering knowledge and overcoming the limitations of traditional discipline-based research to address complex problems that afflict humanity and now seem intractable.

Books published in this series will be solicited from scholars working across academic disciplines to address challenges to sustainable development in all areas of human endeavors.

This is an official book series of the Integrated Research System for Sustainability Science (IR3S) of the University of Tokyo.

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Education and Practice

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Preface

This book explores implementation challenges of the 2030 Sustainable Development Agenda, by specifically focusing on unique operational issues associated with each of the 17 Sustainable Development Goals (SDGs). In doing so, the book draws attention toward sustainability science, education, and community capacity-building needs related to the specific SDG targets and indicators. The target audience of the book are sustainability leaders, namely, policy-makers, sustainable development planning practitioners, academicians, and graduate students in various disciplinary domains associated with sustainability science, education, policy, management, and impact.

The Sustainable Development Agenda, which was adopted by the United Nations (UN) in 2015, is a universal, integrated, and human rights-based program. It underscores links between peace, social justice, and development. Consequently, its associated 17 SDGs are wider and much more multidimensional in scope, compared to its predecessor program, the Millennium Development Goals (MDG) (2000–2015).

The MDG program was the first concerted effort at a global scale to address extreme poverty and basic health-care needs. The eight identified goals were manageable and measurable and, most importantly, could be easily identified by a wide range of stakeholders, across the globe. During the 15-year period, the MDG program was able to achieve certain remarkable outcome – although the progress was uneven. Therefore, there is a need to create a new framework to achieve inclusive sustainable development.

The Sustainable Development Goals encompass the Millennium Development Goals and at the same time incorporate several newer goals, such as building resilient infrastructure, promotion of inclusive and sustainable industrialization, and fostering innovation (SDG 9); reduction of inequality within and among countries (SDG 10); making cities and human settlements inclusive, safe, resilient, and sustainable (SDG 11); ensuring sustainable consumption and production patterns (SDG 12); etc. Table 1 shows a comparison of MDG and SDG targets.

The millennium goals expressed solidarity with the poorest and the most vulnerable. It galvanized the global community to fight poverty and its multiple dimensions.

Table 1 The Millennium Development Goals and the Sustainable Development Goals

Millennium Development Goals	Sustainable Development Goals
MDG1: Eradicate extreme poverty and hunger	SDG 1. End poverty in all its forms everywhere
MDG 2: Achieve universal primary education	SDG 2. End hunger achieve food security and improved nutrition
MDG 3: Promote gender equality and empower women	SDG 3. Ensure healthy lives and promote well-being for all at all ages
MDG 4: Reduce child mortality	SDG 4. Ensure inclusive and equitable quality education
MDG 5: Improve maternal health	SDG 5. Achieve gender equality and empower all women and girls
MDG 6: Combat HIV/AIDS and other diseases	SDG 6. Ensure availability and sustainable management of water and sanitation for all
MDG 7: Ensure environmental sustainability	SDG 7. Ensure access to affordable, reliable, sustainable, and modern energy for all
MDG 8: Develop a global partnership for development	SDG 8. Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work
	SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation
	SDG 10. Reduce inequality within and among countries
	SDG 11. Make cities and human settlements inclusive, safe, resilient, and sustainable
	SDG 12. Ensure sustainable consumption and production patterns
	SDG 13. Take urgent action to combat climate change and its impacts
	SDG 14. Conserve and sustainably use the oceans, seas, and marine resources for sustainable development
	SDG 15. Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt biodiversity loss
	SDG 16. Peace, justice, and strong institutions promote peaceful and inclusive societies for sustainable development
	SDG 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development

Source: prepared by authors based on open-source data available under UN

The 2030 agenda moves on from their targeted action bound programs on a wide array of interlinked developmental concerns.

The 2030 development agenda revolves around the concept of sustainability and also takes a comprehensive system view about the developmental paradigms. Embedded in the concept of sustainability is the idea of striking a balance between meaningful economic growth, environmental well-being, and social justice. Thus, the 17 SDGs are not directed to arrive at a trade-off between competing claims related to progress from multiple ideological standpoints. Rather, they are cross-

cutting, are inter-sectoral, and complement each other in many ways (Babier and Burgess 2017). Thus, for example, provision of quality education (SDG 4) and safe drinking water (SDG 6) to deprived areas and slum settlements helps the communities and cities become more sustainable (SDG 11), improves health conditions of the people (SDG 3), and is also simultaneously an antipoverty (SDG 1) measure, as it reduces livelihood vulnerabilities by building community capacity-building. Thus, each of the SDG and targets are multidimensional in scope but also tied with each other.

As the Sustainable Development Agenda now sets the vision for 2030 for global action, its success depends on how far they are localized and integrated with national, subnational, and local plans of various countries. Policy-makers, academics, educators, and practitioners have embarked in activities aimed to integrate SDGs in policy documents, research agenda, and academic course curriculum. Yet, a major problem confronting these actors is a lack of knowledge about the operationalization of SDGs, which compromises their ability to disseminate knowledge in an impactful and contextualized manner. Some researchers and educators have proactively become active participants in the implementation of the SDGs across the world, representing a potential for global change.

Tokyo, Japan
Brisbane, Australia
Kakudia, Odisha, India
Brisbane, QLD, Australia
Sydney, NSW, Australia

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Chapter 1

Towards Impact Sustainability



Introduction

Isabel B. Franco, Tathagata Chatterji, Ellen Derbyshire, and James Tracey

This book contributes to sustainability studies, as it focuses on local operationalization of all 17 Global Goals in an impactful manner. This book is the result of collaborative and interdisciplinary research work by sustainability leaders from all over the world, namely, scientists, researchers, educators and practitioners. Disconnected educational systems and policy practices from global and local sustainability trends create scepticism about the potential of the research institutions in contributing towards policy debates and issues centring on the question of sustainability, which compromise the wellbeing of all. Preliminary investigations identified that a few reasons for this were limited understanding of the context; lack of an overall approach to sustainability, such as the Sustainable Development Goals (SDGs); and inadequacies in the education sector and collaboration processes amongst academics, educators and practitioners to achieve global sustainability targets (Franco et al. 2018; Franco and Tracey 2019).

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In this context, the overarching aims of this book are to provide coverage of results of research conducted in accordance with the SDGs and to better understand the integration of the Global Goals as an integral part of impact research, curriculum and community capacity-building for sustainability. This book also advances sustainability science itself in the development of both research and education models to SDGs integration in an effective manner. It does this through case studies and original research across various topics of sustainability science, education and community capacity-building. Embracing the SDGs as a component of research and education for sustainability may help academics and practitioners gain practical tools to teach students on ways to cope with potential global issues. Understanding the way that academia targets the SDGs and collaborates with external stakeholders for the achievement of the 2030 Agenda is also important in helping plan for future generations. The use of the SDGs as the conceptual framework of this book enables this manuscript to develop a better and more nuanced understanding of global sustainability matters and their impact on the local level. The case studies used for the book present research and best practices that target all SDGs across various locations around the globe currently experiencing significant sustainability challenges.

The SDGs not only meet educators and scientists' expectations, but they also address student's concerns regarding sustainability challenges. Students and the broader community are more often concerned about how global sustainability issues affect them. In response, higher education institutions have engaged in integrating the SDGs, in curriculum and science. This approach creates a higher level of impact amongst education institutions and their external stakeholders. This manuscript is therefore essential for educators, scientists and trainers interested in creating impact by integrating the SDGs in research, educational curriculum and capacity-building.

SDGs integration in curriculum fosters contemporary education practices that go beyond traditional forms of teaching, research and capacity-building and positions education institutions as powerful agents of global change. Embarking on more sustainable education practices is pivotal for helping students and the broader community meet social and environmental demands and for overcoming the challenges of socioeconomic development both at the local and global levels. The SDG approach is rapidly changing the role of education institutions by placing them at the forefront of sustainable development. This approach also provides a competitive advantage to education institutions.

SDGs have been relatively well studied and documented in various fields such as governance and business, yet more research is necessary to understand SDGs integration in education-related sectors. Although there have been many successful SDGs integration initiatives around the globe, most of those do not align with education, research and capacity-building agendas (Franco and Tracey 2019). Consequently, education institutions should facilitate the embrace of SDGs in curriculum, research and capacity-building. Accordingly, this publication aims to increase the knowledge of educators, scientists and trainers on the SDG approach and pathways for its integration. Therefore, this book unpacks the key role this approach can play in promoting impactful education, research and capacity-building practices and, ultimately, in contributing to the SDGs. The book consists of 18 chapters targeting each one of the 17 SDGs in science, curriculum development, policy and capacity-building.

The second chapter, by Franco and Minnery, discusses anti-poverty measures under SDG 1. Applying the sustainable livelihood framework (SLF), they explore community capacity-building projects in resource regions. The research highlights how the SLF shows interconnections between SDG 1 and SDG 11 in tackling multiple dimensions of poverty. The third chapter by Creegan et al. focuses on SDG 2 ending hunger and achieving food security through sustainable agriculture. The chapter highlights the need for organic waste recycling programmes to apply locally available resources, appropriate technologies, and localization measures based on specific community needs assessment. The research also shows how the overlapping nature between SDG 2 and SDG 6 for sustainable waste management and water conservation measures. The fourth chapter by Belen Federico studies health and wellbeing measures under SDG 3. By focusing on effects of ultraviolet radiation on human DNA, the research reported in this chapter shows that DNA is seriously damaged by higher UV radiation caused by ozone layer depletion.

The fifth chapter by Franco and Derbyshire is linked to SDG 4 quality education and connections with SDG 17 partnerships for the goals. The chapter pays nuanced attention to the nature and importance of limiting and fostering factors in a collaborative governance scenario towards the achievement of SDG 4 quality education and in the pursuit of education for sustainable development. Moving on, from there, the next chapter by Franco, Salinas and Derbyshire shows how existing education practices at higher education institutions of Latin America produce patriarchal systems detrimental for the sustainable leadership of women in male-dominated industries. The chapter makes reference to SDG 5 concerns on gender equality. Chapter 7 by Cano et al. is on provision of clean water sanitation under SDG 6. It shows how the mining industry is confronting water scarcity challenges through efficiency in technological applications and through the implementation of different strategies such as the efficiency of resources, the optimization of process efficiency and circular economy.

Chapter 8 by Franco, Powell and Whereat explores how women can boost their assets and capacities to cope with the effects of unsustainable energy consumption. This capacity-building analysis primarily links up with SDG 7 affordable and clean energy but also connects with SDG 5 gender equality and SDG 12 sustainable production systems. Similarly, Chap. 9 although primarily addresses SDG 8 concerns regarding decent work and economic growth but also has great relevance for SDG 12 concerns regarding production systems. Ribeiro-Duthie's research draws attention towards economic opportunities drawn by fair trade certified small producers. Franco, Gonzalez and Buitrago in Chap. 10 show that community capacity-building roadmap can enhance the ability of local communities to foster innovative industrial practices for sustainable resource development and the achievement of SDG 9 Industry, Innovation and Infrastructure. The following chapter by Power investigates how superannuation-related social benefit schemes could further SDG 10 objectives of reducing financial inequalities.

Unlike other sustainability goal which is organized along specific sectoral indicators and targets, SDG 11 objectives of urban sustainability are spatially defined. Chapter 12 by Vaidya and Chatterji focuses on SDG 11 as the analytical framework to explore how the transformative force of urbanization represents opportunity and challenge to meet several sustainability challenges, such as SDG-1, poverty reduc-

tion, SDG 4 (education), SDG-5 (gender equality), SDG 6 (clean water and sanitation), SDG 7 (affordable and clean energy), and SDG 8 (economic growth). The following chapter by Franco and Newey looks at responsible production and consumption practices under the SDG 12 umbrella. Based on a case study method, this chapter shows how the corporate sector can contribute to sustainable community development through a multidimensional approach to wellbeing for entrepreneurship. It also provides some conceptual and practical tools towards enhanced accountability for sustainable production and therefore the achievement of SDG 12. Next, Chap. 14 by Franco, Tapia and Tracey provides a capacity-building framework to move from climate education to action and towards the achievement of SDG 13.

Chapter 15 by Palomino discusses SDG 14 target of life below water by looking through utilization of fish skin as a sustainable raw material for fashion industry. Fish skin leather processing could prevent and significantly reduce marine pollution and sustainably protect marine ecosystems in order to achieve healthy and productive oceans. As such this also promotes SDG 12 targets. The fashion industry is also the topic of discussion of Chap. 16 by Arana, Franco, et al. This chapter links to Goal 15 Life on Land as it explores alternative organic materials and recycled processes for the sustainable production of yarns used in the fashion industry in a sustainable manner. Chapter 17 by Franco and Derbyshire makes a strong contribution to SDG 16 as it examines the role of women in sustainable peace in the context of resource regions. Chapter 17 explores the role of global business networks in the pursuit of corporate accountability and sustainability reporting. The book finishes drawing conclusions and impact sustainability recommendations.

The book highlights the value of sustainability science on newly emerging and innovative approach towards research, education, capacity-building and practice in order to transform rhetoric into impact sustainability while encompassing cases from various industries, sectors and geographical contexts. The case studies are collected from different geographical contexts and industries, provide insights into themes that cut across sustainability science and that aid the fulfilment of the SDGs building more resilient, sustainable, equal and inclusive societies and the environment.

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Chapter 2

SDG 1 No Poverty



Building Sustainable Communities: A Framework for Supporting Community Livelihoods and Poverty Alleviation in Resource Regions

Isabel B. Franco and John Minnery

Abstract This chapter proposes the use of the sustainable livelihood framework (SLF) as a powerful conceptual approach for research aimed at understanding the interaction between global investment, local livelihoods and poverty reduction in resource regions. The chapter applies the SLF as a tool to develop recommendations for poverty alleviation, showing how it can contribute to SDG 1 No Poverty. The innovative application of the SLF helps us understand the ways in which key areas of research connect and interact as constituent components inherent in the framework. This chapter also argues that this framework helps increase our understanding of the ways communities build capacity to forge sustainable livelihoods in resource regions. It thus presents a justification for the use of the SLF, followed by an examination of the SLF principles, their implications for communities and relevance for empirical research in this field. The chapter also shows the way in which the SLF can be modified for application to local circumstances through case studies conducted in two resource regions of Colombia. Nevertheless, the findings of the research can be applied to other resource locations elsewhere.

Keywords SDG 1 No Poverty · Sustainable livelihoods · Community · Resource regions · Sustainability

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2.1 Introduction

This chapter proposes the sustainable livelihood framework (SLF) as the governing conceptual approach to research that explores the interaction between global resource development and local livelihoods in resource regions. It also provides recommendations relevant to the achievement of SDG 1 No Poverty through suggestions for poverty alleviation and thus contributes directly to SDG1 No Poverty. The innovative application of the SLF helps us understand the way in which key areas of research connect and interact as inherent constituent components of the SLF. This chapter also argues that this framework increases our understanding of community capacity-building for forging sustainable livelihoods in resource regions. It presents a justification for the use of the SLF, followed by an examination of the SLF principles, their implications for communities and relevance for empirical research in this field. The chapter shows the way in which the SLF can be modified for application to local circumstances.

The SLF is an approach to sustainable development extensively applied by aid agencies to examine poverty issues in the developing world. In the recent years, a wide number of frameworks have served as a platform to better understand community livelihoods in resource regions. The SLF is one such (see Fig. 2.1). Originally developed to help address rural poverty in the Global South (Carney 2003; Rakodi and Lloyd-Jones 2002), here it is adopted to link mining activities and community livelihoods. The chapter also shows the way in which the SLF can be modified for local application, in this case through two case studies conducted in Antioquia and Risaralda, two resource regions of Colombia (Franco 2014). Nevertheless, the findings of the research can be applied to other resource locations.

Resource exploitation provides both strong advantages and powerful difficulties to the communities adjacent to the resource operations (such as mining, oil and gas). This chapter explores the mining case. Communities are often highly dependent on mining for employment and financial support, but this dependence comes with inevitable economic, social and environmental vulnerabilities. If these communities are in the Global South, the difficulties are exacerbated because they experience unequal access to political and economic resources, poor local governance, unbalanced access to the resources and often, low levels of education and skills (Franco 2014). Yet mining can also be a critical component of local, regional and national sustainable development.

This chapter is based on research into mining-dependent communities in resource regions of Colombia. It focuses on community livelihoods in these resource locations and through this develops a framework to show how mining and exploration interventions can help support communities adjacent to mining operations to maintain their livelihoods, meet their own development aspirations and reduce poverty. The framework used in the chapter is based on the sustainable livelihoods approach (Carney 2003, pp. 14–15; Rakodi and Lloyd-Jones 2002), but it modifies this classic approach to make it more appropriate to resource regions where mining forms a major component of the local and regional economy.

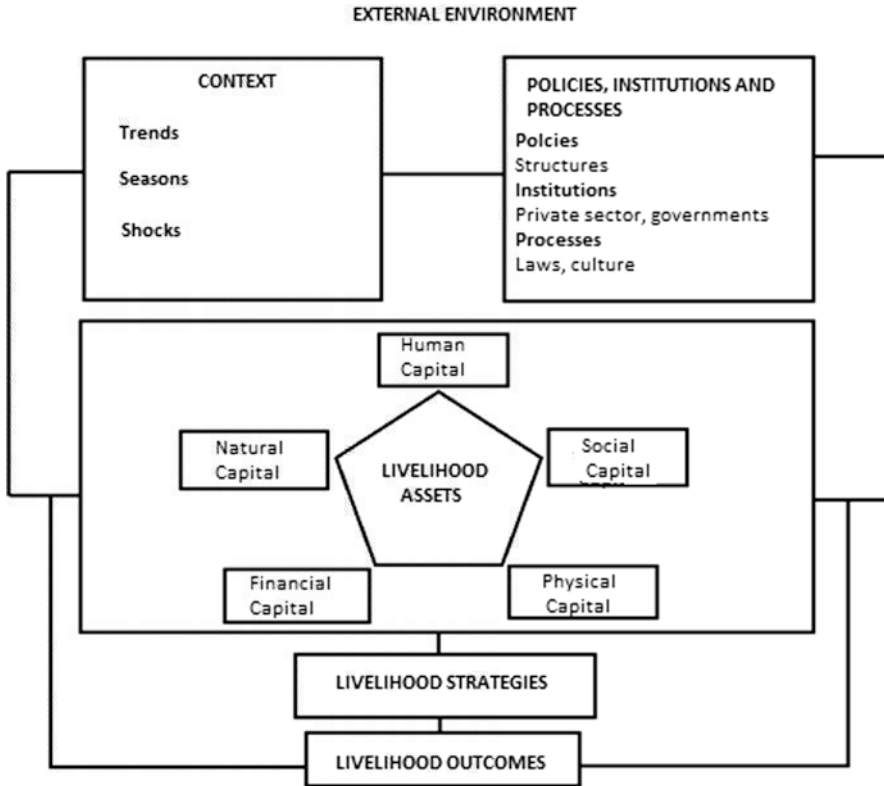


Fig. 2.1 Modified sustainable livelihood framework. (Modified from Mandke 2007 and Rakodi and Lloyd-Jones 2002)

The chapter provides (below) an overview of the research and introduces the case study area. It then examines the implications of the principles underpinning the sustainable livelihoods framework for communities adjacent to mining and thus demonstrates how the original principles and structure of the classic SLF need to be modified to be applied in this context. This is followed by a presentation of the research findings, concentrating on three components of the sustainable livelihoods framework: context, governance and livelihood assets. The original SLF structure is shown in Fig. 2.1, and the details of how the original SLF are modified to apply to the subject matter of the research are shown in Fig. 2.2. The ways in which it is modified are explained more fully in the remainder of this chapter, but in summary the contextual component and governance component of the modified SLF deal principally with aspects particularly relevant to communities dependent on mining, and the focus is on the community asset of human capital rather than all five forms of asset (human capital, plus natural capital, social capital, financial capital and physical capital) usually considered. The final section of the chapter provides recommendations for ways of improving social sustainability for settlements and communities in mining regions based on the key findings identified in the paper.

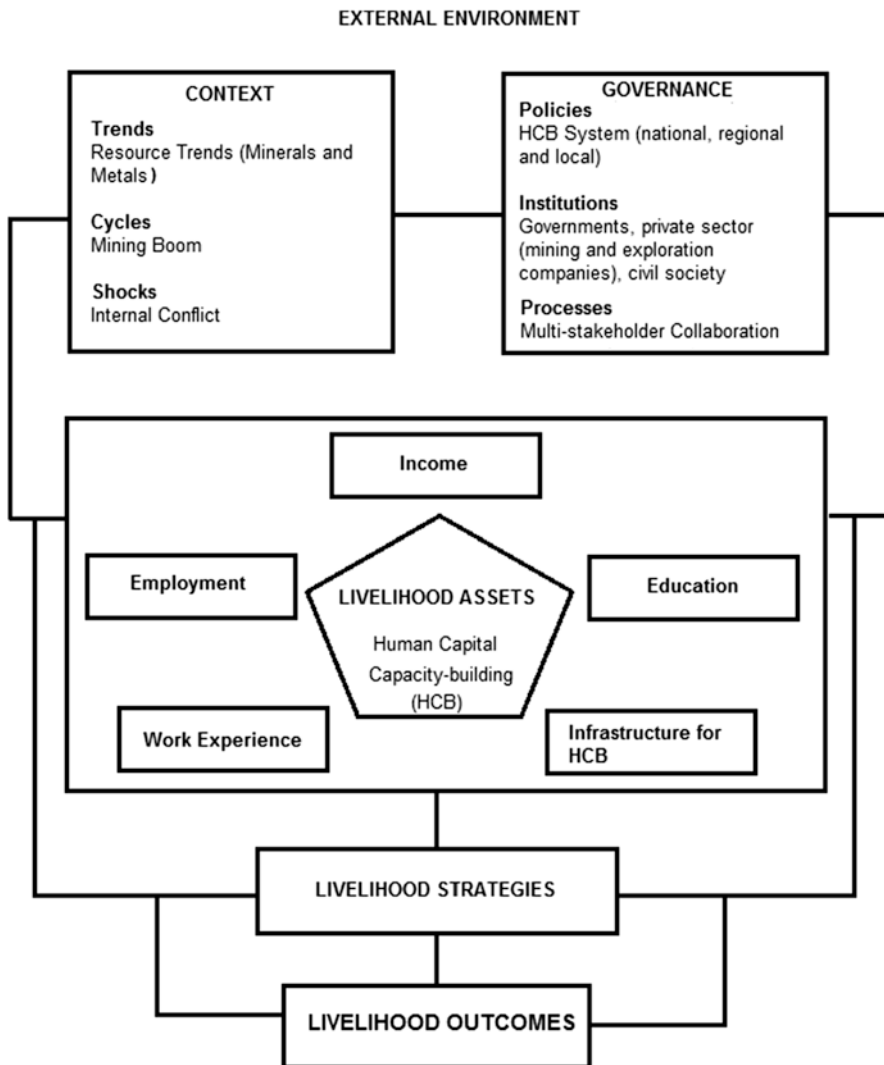


Fig. 2.2 Modified sustainable livelihood framework. (Modified from Mandke 2007 and Rakodi and Lloyd-Jones 2002 (see Franco 2014))

2.2 Methodology

The research findings came from document analysis (policy analysis), face-to-face semi-structured interviews with community, mining and government stakeholders, field work and participant observation and group interviews in two case study areas in Colombia. The research deals with diverse and multiple sets of data requiring the application of the case study method. The case studies allow for detailed and

comprehensive information to be collected about a more focused issue. The research was also organised to follow the structure of the SLF.

2.2.1 Research Overview and Case Study Areas

Colombia is located in the north of South America and has experienced an escalating mining growth over the last three decades. It is the main producer of coal in Latin America and the twelfth largest globally, the third major producer of nickel after Cuba and the Dominican Republic and is also known as a leading exporter of gold and emeralds (Idarraga et al. 2010; Torres 2001; Vilora de la Hoz 2009). Mining along with oil extraction represented 4.6% of the national GDP in 2005 (UPME 2006, p. 19). The resource boom is not particular to a specific region, with exploration and mining operations being spread throughout the country.

The research presented here was undertaken in Risaralda and Antioquia, two resource regions, located in the Colombian Andes mountain range. These geographical areas are some of the most active producers of minerals and metals in Colombia. Mining and exploration projects operated in Risaralda impact on communities and human settlements and their livelihoods in both urban and non-urban areas. Risaralda is highly urbanised, with 665,104 (77.4%) of the total population of 859,666 living in urban areas in 2005 (DANE 2005). With a total of 230,532 households, the average household size was approximately 3.7 persons in 2005.

The State of Antioquia is located on the North Pacific Coast of Colombia. Antioquia has an active mining industry, as it holds the largest reserves of gold, silver, coal, platinum and construction materials in Colombia. Mining projects currently operated by domestic and multinational companies have significant implications for local communities (Cámara de Comercio de Medellín para Antioquia 2010; Sistema de Información Minero Energético Colombiano 2010). Antioquia is also highly urbanised with 4,340,744 (77.5%) of its population of 5,601,507 living in urban areas in 2005 (DANE 2005). The average household size, at 3.8 persons, was similar to that in Risaralda.

2.2.2 The Sustainable Livelihoods Framework (SLF)

The structure used to guide the research presented in this chapter was based on what is variously called the ‘sustainable livelihoods framework’ (Hostetler 2006) or the ‘sustainable livelihoods approach’ (Mazibuko 2013). As Mazibuko (2013, pp. 174–5) makes clear, it is not a theory or a model but ‘as a framework ... [it] helps in considering the phenomenon and recognizing patterns’. It was used in this way in this research. One of the core components of the framework is the notion of ‘livelihood’ itself. A livelihood comprises the capabilities and activities required for the

means of living, so that ‘a livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future’ for both households and communities (DFID 1999, p. 1). The SLF was conceived as a way of thinking about the objectives, scope and priorities for development (Carney 2003, pp. 14–15; Rakodi and Lloyd-Jones 2002).

In 1998, the British Government’s Department for International Development (DFID) adopted the SLF as an approach to assessing and evaluating developmental projects funded by it. Since then several other international organisations, like the United Nations Development Programme and the NGO and CARE, have also adopted the SLF to undertake their projects (Carney 2003). Its potency as a framework lies in the fact that it ‘recognizes that people have many capabilities, have various assets and engage in many activities to earn their living’ as well as recognising that ‘institutions and processes should be clearly understood’ (Mazibuko 2013, p. 175). The focus on assets is critical (Mitlin 2003). The framework also resonates with Sen’s (1979) approach to strengthening communities’ capabilities, for which they need rights and opportunities.

However, despite its widespread use, it has a number of weaknesses. One is that it neither provides an adequate role for the private sector nor provides for broader ideas about governance dynamics (Carney 2003). The study reported in this chapter created a modified version of the SLF that incorporated and expanded these two elements: how private corporations take part in creating sustainable livelihoods, and a broader understanding of governance arrangements. Researchers such as Stead (2015) have linked governance capacity (as broadly defined) to a multinational understanding of urban prosperity, but in this research, governance was explored within the tighter framework of one of the elements of the SLF, namely, human capital.

This modified version of the SLF (see Fig. 2.2) structured the research reported here. The revised framework still follows the key components proposed by Rakodi and Lloyd-Jones (2002, p. 9), namely, the external environment; vulnerability context; policies, institutions and processes; livelihood assets; livelihood strategies; and livelihood outcomes. These key components are linked as shown in Figs. 2.1 and 2.2, but the modifications identified in Fig. 2.2 create a framework that is more suited to understanding the Colombian mining case and the research focus specifically on human capital as an intangible asset. Such modifications to suit the relevant context have been used by other researchers. For example, Shen, Hughey and Simmons (2003, p. 20), in their review of the use of the sustainable livelihoods approach in the tourism industry, referring to Cahn’s (2006) application of it to her Samoan case studies, noted that ‘a “one size fits all” SLF approach is neither possible nor appropriate – context is important’.

The modified framework shown in Fig. 2.2 identifies the trends, cycles and shocks that affect mining and human settlements in Colombia. Governance processes constitute the core component of the policies, institutions and processes box, but in the context of mining in Colombia, these processes incorporate the activities of multinational and domestic private sector mining and exploration companies, as well as informal mining actors. Human capital and its development are examined as the prin-

cial focus of the livelihood assets box. Although the standard SLF normally comprises five forms of asset (or capital), this research focuses only on human capital in order to reduce the potential complexity of the analysis. The modified SLF constituted a guide to organise the research reported in this paper and also served as a means to review existing activities, understand cause and effect relationships, and provide a structure for analysis and a checklist of ideas (Rakodi and Lloyd-Jones 2002).

2.3 Discussion

2.3.1 *SLF Application and Research Findings*

This section provides a brief explanation of the elements of the SLF that were modified to enable it to be applied to the mine-based communities in Colombia. It also presents the major research findings derived from this application. The main modifications are shown in the boxes labelled ‘Context’, ‘Governance’ and ‘Livelihood assets’ in Fig. 2.2.

2.3.1.1 Context SLF Component

The broader term ‘Context’ is used here rather than the original term ‘Vulnerability context’ found in the SLF literature. Trends are the principal contextual factor for mining in Colombia. Colombian settlements and communities are diverse. Hence, mining impacts on local communities and the benefit they get from the industry are quite different across its various regions. There are some locations where the compensation for natural resource extraction has positively impacted on communities (Warhust 2001); therefore, they cannot always be categorised as vulnerable.

According to the SLF literature, the trends can be positive or negative or national or international and have a strong influence on community livelihoods. Trends in mining activities include increased globalisation of production and sales, greater need for highly capitalised production as easily exploited reserves are depleted and changes in consumption patterns that are built on particular mineral resources, such as demand for gold in India and increasing energy demand in the developing world (Surborg 2012). On the other hand, cycles (referred to as ‘seasonality’ in the classic SLF literature, such as Rakodi and Lloyd-Jones 2002, p. 14) pertain to recurrent economic shifts and employment opportunities. In a mining context, they also refer to the stages of the mine life cycle (Hitch et al. 2014). The current mining boom is fostering important global mining and exploration projects across Colombia which have aspects of both longer-term trends and short-term cycles. These resource fluctuations have had implications for the domestic economy and local communities’ livelihoods, particularly in terms of regular fluctuations in the value of minerals and livelihood and employment opportunities.

The 'Context' SLF component also includes the concept of shocks. These shocks constitute factors that might destroy community assets such as floods and droughts but also resulting in or from conflicts or wars (Rakodi and Lloyd-Jones 2002, p. 14). The revisited version of the SLF proposes the Colombian internal conflict (or civil war) as a shock. It is also argued that internal conflict and local impacts have had serious implications for community livelihoods. The application of the SLF to the Colombian mining context highlights that shocks, in the form of civil war and the involvement of illegal groups, are perhaps the most sensitive issues that settlements and communities in resource regions have to deal with and therefore deserve major attention. The involvement of illegal groups in resource regions through informal small-scale mining has exacerbated historical conflicts and adversely affected stakeholder interactions. The interviews conducted for this research showed it has also diminished the potential of enhancing community assets as a driver for social sustainability (Franco 2014):

Why do you think there is violence in the world? What do you do when you have a family to support and you do not have a job? ... you do whatever to get some income to feed your children, right? Well, there are many people experiencing this situation in this region, even though this is a mining region ... The situation is very complex in these towns. At least 3 to 4 people are killed every day ... This has got worse during the last three months. (NGO Director from Antioquia, Interview, November, 2012)

Civil society actors and government representatives both agree that relationships between companies and other stakeholders have deteriorated in the two regions. In addition, the escalation of global mining interests in the regions is causing resentment amongst legitimate small-scale miners. These groups are highly dependent on mining which they perceive as the only employment opportunity and therefore their only livelihood option. Consequently, legitimate small-scale miners regard the arrival of multinational exploration and mining companies as a threat to their livelihoods. This situation has increased resistance from these groups against multinational companies. The whole situation has also been intensified by armed conflict.

Internal conflict dynamics have been exacerbated by illegal groups including guerrillas, paramilitary and *bacrim* (criminal bands). These illegitimate actors own small-scale mines to launder money or support their illegal businesses. In addition, they have found the current mining boom to be the best opportunity to extort money from companies operating in the two regions. Community livelihoods have been heavily impacted by the indirect benefits of mineral extraction to these groups. Very often communities and human settlements cannot actively engage in human capital/asset enhancement initiatives as they feel threatened by these groups. On the other hand, governments and companies are reluctant to further engage with some small-scale miners and community members due to their suspicions of links between locals and illegal groups. This has not only aggravated the level of discontent and violence in remote resource areas but has also resulted in destruction of livelihoods, since communities reap very little benefit from collaborative endeavours in these circumstances. These limiting contextual factors have also been detrimental for the role of the private sector in the governance environment in resource regions.

2.3.1.2 Governance: Policies, Institutions and Processes

A broader examination of the governance environment was carried out in the light of the important component of the classic SLF of policies, institutions and processes (PIP) (Fig. 2.1). This component deals with the governance environment in which livelihoods are constructed (Rakodi and Lloyd-Jones 2002, pp. 15–16). For the purpose of the research reported in this chapter, governance processes include the interactions between three stakeholders: government, the private sector (particularly mining and exploration companies) and civil society (Minnery 2007). Thus, in Fig. 2.2, this is labelled as the ‘Governance’ box.

The mainstream presentations of the SLF exhaustively discuss government and community roles in developing sustainable livelihoods; however, they have little to say about the private sector’s role (see, e.g. Rakodi and Lloyd-Jones 2002). The research reported here emphasises the critical potential importance of the private sector in the design of sustainable livelihood options for communities and in the opportunities to reduce poverty in resource regions. The literature on mining emphasises that companies have a responsibility to contribute to other economic futures in addition to mineral extraction that in fact they have a social responsibility (Hitch et al. 2014). Some of the incentives for private mining companies to do this include, but are not limited to, obtaining a ‘social licence to operate’, responding to international standards and regulatory frameworks and being accountable to their shareholders but also to their wider stakeholders (Freeman 1984). Companies’ contributions to community livelihoods differ according to the context and governance dynamics in which they are immersed (Franco and Robertson 2014; Franco 2014):

We do not implement initiatives different from mining because we do not have direct relationship with other sectors...we think that tourism or agriculture are sectors in which we do not fit. For this reason we focus on education for mining. (Senior Corporate Representative, Interview, October, 2012)

In addition, it was also found that if the improvement of local livelihoods is identified as a policy goal, then companies need both to be more active in support of this and to be more accountable to communities. This will help communities enhance their coping capacities, which will then enable them to overcome imminent challenges posed by the expansion of mining and exploration projects. Research shows that while corporate social responsibility agendas are vital to help communities design livelihoods relevant to their development aspirations, in practice such agendas have serious constraints that challenge corporate efforts (Franco 2014). In most cases these agendas for human capital/asset enhancement are top-down approaches intended mainly to enhance human capital to attract and retain skilled workers for the industry.

Nevertheless, mining and exploration companies can still play a stronger role with the implementation of bottom-up and locally driven social responsibility agendas. Such approaches can become some of the main enablers for local development, poverty mitigation and overall sustainability. Developing bottom-up (economically

diversified) as opposed to top-down (mining focused) social responsibility agendas could have positive implications for communities. In addition, the research indicates that those agendas need to go beyond just mining practices and provide local communities with alternative non-mining livelihood options, enabling an expansion of their life plans and the enhancement of the human capital assets required to become more sustainable during and after the life of the mine (Buitrago-Franco and Robertson 2014).

2.3.1.3 Livelihood Assets SLF Component

Human capital is one of the core livelihood assets in the SLF. According to DFID (1999, p. 1), a livelihood comprises the capacities required for the means of living. This perspective positions people as active participants with a positive contribution to make in their development rather than as passive or deprived actors starved of assets. Community assets are diverse and vary across individuals, households and communities. Colombian communities are often starved of financial and skilled human capital (Cardenas 2011). Strengthening community assets can help locals forge more sustainable livelihoods (Rakodi and Lloyd-Jones 2002, p. 10). The classic SLF involves five forms of capital, which are human, social, physical, financial and natural capitals (as shown in Fig. 2.1). However, the research reported in this chapter focuses specifically on human capital. This section identifies the forms of human capital that need to be further enhanced in resource regions of Colombia to help communities forge more sustainable livelihoods. These are shown in Fig. 2.2, but the justification for using them is contained in the remainder of this section.

The investigation showed that there are five main priority areas for human capacity-building for local communities in mining resource regions. Developing these will hopefully assist locals in forging sustainable livelihoods and so reducing poverty. These areas are employment, education, work experience, income and infrastructure for human capital development (Franco 2014):

I am the only miner in my family. I have three children and want them to study. I am aware of the risks of working at the mine and I did not want them to be part of the industry. This is a mining town... a person who does not go to school becomes a miner. Most of us do not know anything else than mining, hence, we have to work here and sustain our family members with the little income we get. (Community Member, Focus Group, October, 2012)

Although other components of human capital such as health and leadership are important, improving the five identified forms of human capital seems from the investigation to be the most effective way to strengthen the ability of communities to cope with mining-induced changes over time. An important finding from the research here reported was that priority areas which are the most valuable for communities are those that help them achieve their own sustainable development goals. Because of this, bottom-up human capital capacity-building approaches structured into social responsibility agendas are more likely to create value for communities than are top-down approaches. In those cases in which companies had embraced community-oriented and community-driven agendas, locals claim to have become

more resilient. Communities that have been properly consulted about their capacity-building priorities have been able to strengthen key assets, becoming more capable of coping with mining-induced changes. However, such approaches need to be included as constituents of both corporate and government policies. It is not solely the companies' responsibility to make community capacity-building available for communities; governments also need to share responsibilities with companies in this regard, and governments also need to consult communities. All consultation should be genuine and not be merely the token provision of information; it should be such that communities are involved in decision-making about matters such as priorities for the allocation of funds.

At the corporate level, a more people-centred approach to corporate social responsibility for community capacity-building has helped companies in mining locations play a strong role in enhancing human capital and allowed them to contribute strongly to the development of sustainable livelihoods. The implementation of non-mining capacity-building initiatives involving the broader community was found in the research to be more valuable for locals. There are a few cases of companies driving community capacity-building initiatives that place local people at the centre of development. These actions involve the broader community regardless of their engagement with the mining industry. For example, there is active participation from local entrepreneurs and vulnerable groups, but with the assistance of mining companies, so that they can access better business opportunities and so develop livelihoods that do not involve mining. These activities can also have the potential to reduce poverty.

These are examples where both corporations and governments have embarked on socially responsible programmes based on the aspirations and expectations of communities. This has had positive impacts on locals, as the resultant efforts at community capacity-building are more attuned to the context in which they are embedded. In this approach the needs and expectations of the community are highly valued in the implementation of community capacity-building activities. These conditions have made the existing community capacity-building approaches meaningful for all stakeholders but especially for communities, all of which could serve as a valuable model for actors in other regions to follow.

As discussed earlier, the current approach in Antioquia is mainly intended to attract and retain human capital that is skilled or trained for the mining industry. Although there are some wider entrepreneurship development initiatives in place, they were seen by respondents to be insufficient to face the potential challenges created by the mining sector. In spite of corporate investments in community capacity-building programmes and activities, those initiatives have not yet tackled issues that were seen to be critical by the community. Development aspirations have been partially achieved, but powerful mining stakeholders are not playing a sufficiently strong role in protecting community assets or in helping to forge sustainable livelihoods. In addition, the government and private sector actors involved need to take community capacity-building more seriously and devote more resources and attention to the enhancement of community human capital assets, especially by delivering relevant training.

The research identified that there are key forms of training that can be delivered to provide communities and human settlements with more sustainable livelihood options. This was the case in both case study locations. Community training needs to be implemented according to gender and context variables. For example, participants feel there is a potential for dressmaking training for females in both regions. Funded by a Canadian company, some women in Risaralda are learning about and participating in dressmaking. This initiative has the potential to create sustainable value for the company and the community itself. Women are currently designing and making company and school uniforms, so creating a valuable supply chain for the local economy. A similar initiative is taking place in Antioquia; however, active corporate engagement is needed. Women from Segovia, Antioquia, have obtained some funding from the government, but there is minimal support from the large-scale mining companies, so the initiative is under threat. Other women more actively involved in the small-scale mining sector have been partially engaged in community capacity-building initiatives in mining, but this is limiting their possibilities to further expand their livelihood options beyond mining. In this context, women need to become active participants and benefit from a range of training in both case study locations.

In addition, small-scale miners participating in existing community capacity-building in mining need to be trained in other areas different from mineral processing. Lessons can be learned from the current small-scale licensing process in Antioquia. This process involves community capacity-building in areas like finance, accounting, administration and literacy. However, this community capacity-building approach should not be exclusive for small-scale miners but should be applied to the broader community. Key findings also show that there are other forms of training that are being delivered to the whole community, particularly in Risaralda, and that need to be enhanced and replicated in other resource regions in Colombia. For example, training in jewellery design not only adds value to mineral extraction but creates alternative livelihoods for locals. Similarly, major attention needs to be paid to existing agriculture community associations. Agriculture is a key sector in Colombia's economy, and so stakeholders, particularly the private sector, should support agriculture-based livelihood options. Companies operating in Risaralda contribute to fostering both the mining and agriculture sectors. This approach has assisted locals in keeping their traditional skills and knowledge alive. For example, coffee and blackberry production training has been provided by the private sector in the Risaralda case.

2.3.1.4 Sustainable Livelihood Strategies Component

The assets available or stock of capital at the community level can be accumulated, restored, exchanged or put to work to generate income and prevent poverty. Or they can be depleted. The transformation of assets in any of these positive forms constitutes the livelihood strategies in the light of the SLF. Such strategies are more likely to be effective if communities become active participants in their own development. However, this argument needs to be examined carefully, as communities might not

have the capacities or skills to develop their own sustainable livelihood strategies. Hence, strategies in place might be temporary rather than sustainable in the long-term. They may also be of varying degrees of relevance for locals. Following Mandke (2007), livelihood strategies can be examined in consideration of four aspects: combination, substitution, sequencing and clustering. These strategies will be examined here in relation to community capacity-building to recommend alternative ways of creating more sustainable livelihoods for mining-based communities and human settlements in resource regions in Colombia.

2.3.1.5 Combination and Substitution

Combination and substitution are two main strategies that can be implemented to foster sustainable livelihoods. It is advisable to apply these two strategies according to the context and governance environment in which the communities are embedded. Combination entails examining how mining and other livelihoods coexist and the implications of this coexistence for communities. However, assets and livelihoods can also be replaced to help communities adjacent to mining operations develop livelihoods in tune with their development aspirations in what the SLF refers to as substitution. The Risaralda case study illustrates the successful implementation of a combination strategy in which both mining and other traditional livelihoods like agriculture are combined to help communities become more resilient to potential mining impacts.

In Risaralda, examples can be seen where mining has also been combined with jewellery design and trade, a livelihood option that is currently adding value to resource extraction in the region. Conversely, mining training in Antioquia is often substituting for traditional livelihood options such as agriculture, which is compromising community sustainability and even exacerbating poverty.

In this context, the implementation of an economic diversification approach coupled with other initiatives such as food security and farming programmes is highly recommended due to the likelihood that mining impacts will have many adverse implications for livelihoods. This will allow activities like mining to coexist with other industries and activities relevant to the local economy and will add value to other livelihood options relevant to communities, as well as helping to ensure that livelihood options remain open after mines have closed.

2.3.1.6 Sequencing and Clustering

Both sequencing and clustering are examined here. Sequencing relates to the resources that need to be allocated one after the other to build livelihoods, while clustering relates to the group of livelihood assets associated with specific livelihood strategies (DFID 1999). In other words, an examination of these two concepts accounts for existing community assets and potential strategies to further employ these assets. Based on the key findings of the research, communities need to develop

alternative livelihoods to mining. In doing so, there are specific assets that should be enhanced to help provide them with meaningful livelihood opportunities. As discussed earlier, five forms of human capital (income, employment, education, work experience and infrastructure for community capacity-building) need to be further enhanced so that locals can achieve their development aspirations.

Existing income rates are not enough to meet community members' basic needs or those of their families. Governments and companies (with input from communities) need to partner to formulate income generation strategies. Up-skilling communities so that they are helped to obtain higher salary rates is highly recommended, but as shown in the research, this needs to be combined with increased opportunities to earn incomes. This will not only create value for the community but also for the company itself in terms of goodwill and support for its community service obligations.

Employment is an asset that needs to be revisited as it can cause tensions at the community level. Current processes intended to up-skill informal miners and the broader community need further development in order to help locals enhance their capacity to get gainful employment and therefore develop more resilient livelihoods. The research showed that these need to be both within and outside the mining sector. The participation of tertiary institutions and other educational organisations is vital to increase both education and job opportunities and therefore help reduce poverty.

Education is an essential asset to enhance other human capital such as income and employment. Despite the implementation of educational policies at the regional level, education does not always reach the broader, more localised, community. The research showed that locals who benefit the most from educational initiatives are those with the financial capital to be able to afford it. The scarcity of economic resources to enable access to tertiary education is threatening community opportunities to access the educational system. In addition, current vocational community capacity-building initiatives are mainly mining-orientated, particularly in the Antioquia case, which is becoming a limitation for locals whose livelihood options and development aspirations are not always directly linked to the mining industry. Thus, it is recommended that education, particularly at the tertiary level, be secured for locals in non-mining subjects. These need to be subjects that will enhance their ability to take up opportunities that are offered outside the mining sector.

The dearth of both gainful employment options and appropriate education is hindering locals from gaining relevant work experience. This is leading to diminished opportunities for income generation and preventing them from employing other human capital assets that they may have access to. Research shows that issues relating to work experience arose from the Colombian community capacity-building approach and the educational system itself. A more effective educational system implemented to overcome the obstacles of limited prior learning or prior experience faced by community members is needed. Giving credits for work experience is essential. Tertiary education institutions need to embrace such education approaches to help vulnerable communities from resource regions achieve their development aspirations and reduce poverty through community capacity-building in the form of education. Therefore, a review of existing community capacity-building approaches