

**POLICY CHALLENGES FOR DEVELOPING COUNTRIES
IN LARGE SCALE MINING***

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* Funding for the preparation of this publication comes from a South Centre project on Commodities supported by the Canadian International Development Agency (CIDA)

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EXECUTIVE SUMMARY

1. Many developing countries are rich in natural resources and in particular mineral commodities. While the extraction and processing of mineral commodities through large scale mining can make a major contribution to the economies of developing countries by providing export and fiscal revenues, it can also raise economic, environmental and social issues that pose policy dilemmas from the Government's perspective.
2. This paper identifies the limitations derived from the external setting that are faced by developing countries to design, implement and enforce laws and policies intended to foster a developmental strategy based on mineral commodities. The purpose of this paper is to highlight challenges that do not seem to be fully recognized by the "good governance" discourse on decisions related to the extraction and production process of mineral commodities.
3. This paper is structured in four sections. The first one describes the mining production process and the location of mineral resources and specialization patterns. The second section explains the general characteristics of the large-scale intensive mining industry and the operations of Transnational Corporations (TNCs). The final section identifies challenges faced by developing countries to engage in this sector in view of this context and presents policy recommendations.
4. The key findings and conclusions of this research are the following:
5. ***The mining production process*** consists of the extraction of the raw material through mining and then various degrees of processing.
6. ***Location of mineral resources and specialization patterns*** Although mineral commodities are not only located in the territory of developing countries, the specialization pattern in production and exports show that many developing countries are major producers and exporters of mineral commodities and intermediate outputs derived from these commodities while developed countries are major producers and exporters of semi-manufactures.
7. ***Characteristics of large-scale intensive mining:*** The production process involved in large-scale mining is intensive in capital and requires significant investments to pursue exploration and exploitation. In view of this situation, the cost structure contains high fixed costs. Extracting and processing mineral commodities through large-scale mining raise concerns related to environmental effects, social implications and economic performance. In view of these concerns, there has been evidence of declining public trust in the mining and minerals processing industries and questioning the contribution that mineral commodities can make to development.

8. ***Operations of TNCs.*** Taking into account the significant barriers to entry in large-scale mining, TNCs are key players in this sector. These companies are vertically integrated in all stages of the production chain, they have worldwide operations and their operations are guided by the principles of cost reduction and improving profitability. During the last decade, these actors have increased consolidation and vertical integration in many extracting and refining sectors.

9. ***Challenges faced by developing countries.*** The characteristics of this sector described above pose seven challenges to developing countries from the perspective of using mineral commodities in order to foster a broader development strategy:
 - Entering and remaining competitive in the business of processing and trading their own natural resources
 - Designing policies that would use the mining sector as a basis to foster a broader development strategy
 - Preserving the concept of public interest when negotiating the terms on which TNCs operate in the host country
 - Monitoring activities and guaranteeing accountability of TNCs
 - Ensuring that investment flows arrive and
 - Ensuring that investment contribute to development.

10. The ***recommendations*** provided are the following:
 - When strategic national development plans are designed, investment in large-scale mining should be contextualized in terms of the contribution it can make to the development process. In this sense, mineral resources are to be exploited to the extent that such exploitation is environmentally sustainable; provides economic and social benefits to the host country and the local communities surrounding the mining site and that it does not affect the cultural and territorial rights of indigenous communities adversely.
 - To ensure that mining activities take only place to the extent that is sustainable, mineral resource plans should be prepared and complied with and the impact of expanding large-scale mining should be assessed before starting operations.
 - When negotiating the terms under which TNCs will operate in the host country, the latter should request cleaner production technologies for all types of mining activities and that integrated social and environmental social management plans be developed between TNCs, the host government and affected local communities.
 - Health and environmental monitoring schemes should be implemented at the local level with all relevant stakeholders
 - Instances such as Human Rights Commission and the International Labour Organization should be used to voice concerns related to the compliance of TNCs with local laws.
 - The participation of developing countries in multilateral, regional or bilateral negotiations should be guided by the goal of preserving the capacity to pursue active policies to promote development.

POLICY CHALLENGES FOR DEVELOPING COUNTRIES IN LARGE SCALE MINING

I. INTRODUCTION

1. Many developing countries are rich in natural resources and in particular mineral commodities. While the extraction and processing of mineral commodities through large scale mining can make a major contribution to the economies of developing countries by providing export and fiscal revenues, it can also raise economic, environmental and social issues that pose policy dilemmas from the Government's perspective.
2. In that context, the purpose of this paper is to identify the limitations developing countries face to design, implement and enforce laws and policies intended to foster a developmental strategy based on mineral commodities.
3. This paper is structured in four sections. The first one describes the mining production process, the location of mineral resources and specialization patterns. The second section explains the general characteristics of the large-scale intensive mining industry and the operations of transnational corporations. The final section identifies challenges faced by developing countries to engage in view of this context and presents policy recommendations.

II. THE MINING PRODUCTION PROCESS.

A. Description of the process.

4. The production process consists of the extraction of the raw material through mining and then various degrees of processing. In the case of aluminium, copper and iron¹, ores are mined and refined to the semi-manufactures made from the processed metal.

Table 1: Primary production and processed products by individual mineral commodity²

Commodity	Primary production	1 st stage of processing	2 nd stage of processing	3 ^d stage of processing
Aluminium	Bauxite	Alumina	Aluminium refined	Refined aluminium consumption
Copper	Copper ore	Unrefined copper	Refined copper	Refined copper consumption

¹ According to the Commodity Atlas (2003), aluminium, copper and iron ore are the most important mineral commodities in terms of production volume.

² UNCTAD (2003). Commodity Yearbook 2003, Volume II. Geneva. "Raw material output processed in principal developing countries for selected mineral commodities". Pp. 459

Iron	Iron ore	Pig iron	Crude steel	
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B. Location of mineral resources for primary production

5. Mineral resources for primary production are generally located in developing countries but they can also be found in developed countries. For instance:
6. The major bauxite deposits of the world are found in Africa (Guinea, Cameroon), in Australia, in the Caribbean area (Jamaica, Guyana), in South America (Brazil), and in Asia (India and Indonesia). Europe has limited bauxite deposits³.
7. Copper deposits can be found in Latin America (Chile, Peru, Colombia), Asia (Iran, China, Philippines), in the United States, Eastern Europe and Australia. In Africa, copper deposits only exist in Zambia and Namibia⁴.
8. It is estimated that worldwide there are 800 billion tons of iron ore resources, that the United States has 110 billion tons of iron ore, that Russia has one sixth of world deposits and India 5%⁵. Iron ore can also be found in Africa.

C. Specialization in production and exports

9. Today most bauxite mining locations are in the Caribbean area (Jamaica, Guyana), South America (Brazil), Australia and Africa (Guinea, Cameroon). The United States and Canada produce just over half the western world's output of alumina (and aluminium), but both are deficient in bauxite deposits. European countries are also major alumina producers.
10. In the case of copper, mine production takes place in Latin America (Chile, Peru, Mexico), North America (United States, Canada), Russia, Australia and China⁶.
11. Iron ore is extracted in Latin America (Brazil), Australia, China, Russia, India, Europe, US, Canada and South Africa. It is not extracted to the same extent in African countries.
12. Developing countries mainly produce intermediate outputs (for instance copper metal) while developed countries are major exporters of semi-manufactures (such as copper wires).

³ Groupe Intexalu (1997). Encyclopédie de l'aluminium. Chapitre II : la fabrication de l'aluminium. Available at : <http://r0.unctad.org/infocomm/francais/aluminium/plan.htm>

⁴ Singer, Donald A., Berger, Vladimir I. and Moring, Barry C. (2005). Copper deposits of the World: Database, Maps and Preliminary Analysis. US Geological Survey. Available at: <http://geopubs.wr.usgs.gov/open-file/of02-268/>

⁵ Seabgems's Website : <http://www.seabgems.com/iron%20ore.htm>

⁶ UNCTAD and the Common Fund for Commodities (2004). Commodity Atlas. New York and Geneva.

Table 2: World exports of ores and metals by origin

	1999	2000	2001	2002
Developed economies	34,5%	34,8%	32,6%	29,5%
Developing economies	64,9%	64,5%	66,6%	69,4%

Source: UNCTAD Handbook of statistics 2003

Table 3: World exports of some minerals and metal processed products by origin

	Developed	Developing	Major exporters among developing countries
Base metals, ores and concentrates	42,14%	53,64%	Chile, Indonesia, Peru, Jamaica, South Africa, Argentina, Cuba, Brazil, Suriname, Guinea
Coal, lignite and Peat	56,98%	35,72%	China, Indonesia, South Africa, Colombia, Venezuela, Vietnam, India, Myanmar, Korea (DPR), Swaziland.
Iron, steel primary forms	52,79%	25,96%	Brazil, Korea, China (Province of Taiwan), Turkey, China, South Africa, Mexico, India, Venezuela, Iran (Islamic Republic of)
Iron, steel shapes (plates, sheets)	70,45%	22,51%	Korea, China (Province of Taiwan), China (Hong Kong), India, Brazil, Mexico, China, South Africa, Thailand, Argentina
Copper	50,60%	41,18%	Chile, China (Province of Taiwan), China (Hong Kong), Korea, Peru, China, Zambia, Mexico, Indonesia, Malaysia
Aluminium	68,11%	20,69%	China, Brazil, South Africa, United Arab Emirates, Bahrain, Venezuela, Korea, China (Hong Kong), China (Province of Taiwan), Mozambique
Base metal manufactures	73,71%	24,86%	China, Mexico, China (Province of Taiwan), China (Hong Kong), Korea, Singapore, Malaysia, Thailand, India, Brazil
Gold, silver ware, jewellery	59,82%	40,08%	China (Hong Kong), China, India, Thailand, Turkey Malaysia, Mexico, Singapore, United Arab Emirates

Source: UNCTAD Handbook of statistics 2003

13. Metals are intermediate inputs for products such as telecom equipment (parts and accessories), motor vehicle parts and accessories, passenger motor vehicles,

- aircraft, automatic data processing equipment, etc. World exports of these products are dominated by developed countries⁷.
14. Demand for metals is also determined by infrastructure-related investments (for instance transport or construction). In recent years, demand for metals increased in many countries in the south due to economic population growth and to major investments in infrastructure in some fast growing economies, such as China and India. From 1995 to 2002, mineral imports from Asian countries (including fuels) tripled. This expansion of demand affected positively prices of: iron ore, steel and copper⁸.

D. Concerns associated with mining.

15. Mining can have adverse environmental effects globally and locally. High emissions and dust generation resulting from operations involved in extracting and refining minerals cause air pollution and global warming. The local environmental impact may include land and water pollution through dumping of waste materials.
16. Initiatives to address these environmental problems in this sector have evolved with time. The first efforts focused on management of hazardous substances and mining waste, but gradually efforts have expanded to cover issues such as water management, energy conservation and mine rehabilitation.
17. Implementing such environmental impact mitigation or rehabilitation initiatives may involve changes in product specifications, modification of technology and equipment, and optimisation of process operation and management and planning procedures. There is growing evidence that cleaner production technologies and practices can reduce production costs in parallel with reduction of the environmental impacts of mining and mineral processing facilities.
18. The boom and bust nature of extractive industries may also cause social implications. Mining activities are geographically concentrated in enclaves that may face, in response to changes in demand and prices, employment loss due to mine closure and displacement of communities or sudden increases in population, employment and income and strain in infrastructure.
19. From the perspective of economic performance, a lot of literature exists supporting the idea that economies of states dependent on non-fuel minerals tend to under-perform (when compared to economies of states dependent on

⁷ UNCTAD (2004). Handbook of Statistics 2004. "Major exporters for 70 leading products at the SITC Revision 2 Group (3 digit) level. Ranged by average 2001-2002 values".

⁸ South Centre (2005). Dependency of Developing Countries on Non-Agricultural Commodities : Characteristics and Challenges. Analytical Note N° SC/TADP/AN/COM/2. Geneva.

agriculture commodities) and presenting doubts on whether producing mineral commodities can contribute effectively to a poverty alleviation strategy. To cite some examples, the World Bank Extractive Industries Review⁹, Oxfam¹⁰ and academics¹¹ have presented such ideas. According to these sources transparency and accountability issues (“good governance”), are crucial to appropriate management of resources and wealth by governments and by the private sector.

20. In view of these concerns, there has been evidence of declining public trust in the mining and minerals processing industries and questioning the contribution of mineral commodities to development.

III. CHARACTERISTICS OF LARGE SCALE INTENSIVE MINING.

21. Mining operations can be divided into two categories: large scale-capital intensive mining (that are mostly state or foreign owned) and artisanal mining activities. The purpose of this section is to describe several characteristics of large-scale mining operations.

A. Cost structure

22. The cost structure of the mining industry is globally homogenous. This homogeneity is due to the early globalization of mineral and metals markets, which has exerted a strong equalizing pressure in costs across countries. In this structure, high fixed costs are a high proportion of the total costs. These high fixed costs refer to:

1. Investments related to infrastructure for exploration and exploitation.

23. Exploration is a costly activity for which no results are guaranteed: this is why it is often referred to as a “sunk cost”. Before starting the exploitation of a mining

⁹ The Extractive Industries Review (EIR) was launched by the World Bank to discuss, with concerned stakeholders, its future role in the extractive industries. The aim of this review was to produce a set of recommendations that will guide the involvement of the World Bank in oil, gas and mining sectors. The discussion was within the context of the World Bank’s Group overall mission of poverty reduction and the promotion of sustainable development. This global review was initiated in July 2001 and completed in December 2003 with the EIR recommendations published in the final report entitled “Striking a Better Balance”. Available at:

<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTOGMC/0,.contentMDK:20306686~menuPK:592071~pagePK:148956~piPK:216618~theSitePK:336930,00.html>

¹⁰ Ross, Michael (2001). Extractive Industries and the Poor. OXFAM America.

¹¹ In their 1997 entitled “Natural Resource Abundance and Economic Growth”, economists Jeffrey Sachs and Andrew Warner concluded that countries with high ration of natural resource-based exports to Gross Domestic Product tended to grow more slowly than countries with less resource-intensive economies.

project engineering studies, economic studies, feasibility studies have to be completed and depending on their results, production and investment decisions will take place. Exploitation refers to gaining access to the ore and preparing it for production. Exploitation costs include equipment and machinery for drilling and doing rockwork. Other expenditures that are related to the development of a mine relate to environmental protection and to the restoration of the mine after production ends.

2. Associated infrastructure.

24. For instance, transport related investment is particularly relevant in the case of iron ore and we can see that dedicated iron ore railways are common in the leading producer countries to bring the ore to ports for exports and for further processing.

3. Inputs for production.

25. For example, the production of some non-ferrous metals is particularly energy intensive. The production of aluminium from alumina is very energy intensive: it starts with bauxite and a relatively energy-intensive process is required to refine that into alumina. Smelting alumina into primary aluminium metal is even more energy-intensive.

4. Research and development and technological know how

26. These are intangible assets associated with managing large complex engineering operations within time and budget constraints. In the case of the aluminium sector, technological developments are typically concerned with improving energy-efficiency and reducing waste and emissions. In other sectors (such as gold) the technology component is associated with exploration methods to identify highly prospective target areas.

27. This sector is hence characterized by significant barriers to entry that derive from scale, capital intensity and technology of exploration and exploitation.

B. Transnational corporations (TNCs)

28. TNCs are defined as enterprises which own or control production or service facilities outside the country in which they are based. In the large-scale mining sector, characterized by significant barriers to entry, TNCs are key actors because they have the technological know how, they have financial resources, they have global logistic and marketing capabilities and they may have mine ownership. In this context, these corporations may have higher levels of efficiency when compared with domestic firms.

29. The ultimate goal of TNCs is pursuing profitability, achieved through cost reduction. Cost reduction can be achieved with economies of scale, achieved through the following strategies.

1. Vertical integration

- 30. Vertical integration relates to the involvement of one company in all stages of the production chain. In the case of mining, this chain is comprised of exploration, extraction, processing, marketing and trade. TNCs involved in the mining sector generally participate in several stages of this value chain and deal with several mineral commodities¹².
- 31. Vertical integration may also extend to other sectors that provide inputs for the production process. To cite an example a number of aluminium producers (including ALCOA and BHP Billiton) have been involved in building dams in Brazil to provide cheap energy for production.
- 32. Vertical integration can even extend to ownership of mines. Many TNCs have acquired mines in developing countries as part of a strategy to secure the source of supply and to have flexibility to respond promptly to a sudden increase of demand.

2. Consolidation

- 33. Consolidation means that fewer large companies run the business. The purpose of consolidation in the mining sector is to reduce structural costs in operations. Although consolidation might not influence the prices of mineral commodities or metals, it does imply increasing market share and controlling almost all stages of the value chain. TNCs are responsible for most of the world's mineral resources extraction and production processes.
- 34. Consolidation in the mineral commodities sector has been a reality for many years. In 1983, three to six TNCs accounted for more than 80% of world trade in copper, bauxite and iron ore, in terms of sales. In 1991, the world's two largest mining companies - Rio Tinto and Anglo American - delivered more than 30% of official world gold production¹³.
- 35. In the last 5 years, the minerals and metals sectors have witnessed increasing consolidation. Mergers and acquisitions have become important tools for managers in the mining industries to gain value for their companies and in this context, they have provided for greater corporate mobility, market share and

¹² See Annex 1: Top 10 companies in world metal mining in 2003.

¹³ Friends of the Earth International (2001). The role of transnational corporations in the World Trade System. The Citizen's guide to Trade, Environment and Sustainability. London.

- control over all aspects of production. These consolidation tendencies have particularly affected the iron ore and aluminium sectors.
36. In the iron ore sector, the number of mergers and acquisitions has increased since 2000. Forecasts for increasing iron ore demand (in part due to China's increased dependence on high quality imported ore as an input for its steel industry) has been an important factor for the industry consolidation, with a view to implement aggressive expansion plans. Consolidation has taken place in mine ownership and seaborne trade. The "Global Big Three" (CVRD, Rio Tinto and BHP Billiton) control more than 30% of production and 70% of seaborne trade¹⁴.
37. In the aluminium sector, companies such as Alcoa, Norsk Hydro, Chalco and Rusal have engaged in acquisitions. The Alcan Group went through more than 12 acquisitions in the last 4 years¹⁵. In 2001, a merger took place between BHP (Australian minerals and steel corporation) and London-based mining company Billiton creating thus the world's largest mining and exploration group and the second biggest diversified resources company, just behind US-owned giant Alcoa.
38. This trend has also affected other sectors. For instance, the last three years have shown a high degree of concentration of corporate control of zircon production. In 2001, the twelve largest producers combined accounted for 80% of the world total output. Four corporate groups now effectively control about three quarters of the world's zircon supply: Iluka Resources, Rio Tinto, BHP-Billiton and Anglo American¹⁶.
39. There has also been significant consolidation in the copper mining business: 53% of copper mine production is in the hands of ten producers and six companies control 30% of the smelter capacity¹⁷.

IV. CHALLENGES FOR DEVELOPING COUNTRIES.

40. Developing countries face several challenges in view of the issues described in the previous sections.

¹⁴ AME's iron ore Update (2004). Minebox Online Portal (The complete Australian mining and industrial purchasing tool). Available at: <http://www.minebox.com/story.asp?articleId=4949>

¹⁵ Evans, Richard B. (2005). The Aluminium Odyssey – Threats and Opportunities for our Industry's Future. Notes of the Executive Vice President of Alcan Inc. for the 10th World Aluminium Conference. Reykjavik, Iceland, 14 June 2005.

¹⁶ Roskill Consulting (2004). "Zircon prices continue to rise as demand exceeds supply". Media Advisory and report highlights for the *Economics of Zirconium*, 11 Edition. Available at: <http://www.roskill.com/>

¹⁷ Pannel, Dereck (2004). "Global Copper Outlook – A miner's view". Presentation of the President and Chief Executive Officer of Noranda Inc. during the 3rd World Copper Conference. Santiago de Chile, 20-22 April 2004.

A. Entering and remaining competitive in the business of processing and trading their own resources

41. As described above, this sector is characterized by significant barriers to entry that derive from scale, capital intensity and technology of exploration and exploitation. In this context, although resources might be located in the territory of developing countries, most of them face difficulties to enter and remain competitive in the business of processing and trading their natural resources, where most of the value added is.
42. In spite of that, the following large companies in developing countries are registered among the 10 world's largest companies in this area:
 - Aluminium: China, Venezuela, India and Guinea (state owned)
 - Copper: Chile and Mexico
 - Gold: South Africa, Uzbekistan and Ghana
 - Iron ore: Brazil, India, Ukraine, South Africa
 - Lead: Mexico, Peru
 - Zinc: Peru, Mexico

B. Designing policies that would use the mining sector as a basis to foster a broader development strategy

43. Mining and extractive industries can make a major contribution to the economies of developing countries by providing export and fiscal revenues. Besides that, they can also contribute to foster a sustainable development strategy if linkages are developed between this sector and other sectors associated with the mining activities and with other sectors of the economy, and if the social and environmental impacts of such industries can be effectively addressed.
44. In connection with the social implications associated with mining operations, the policy objectives for developing countries would be to mitigate (a) the effects of the loss of traditional livelihoods and (b) the loss of access to traditional resources and (c) employment losses and loss of income when mine closure occurs. Many developing countries face the challenges designing policies to meet these objectives because social safety nets do not exist and public spending policies are not possible due to financial constraints.
45. Furthermore, developing country policymakers may face often-conflicting policy priorities with respect to the encouragement of investments in large-scale mining, the protection of the environment, and the promotion of the rights of local communities that might be affected by large-scale mining activities.
46. The challenge therefore lies in regulating the mining industry in a manner consistent with a long-term strategic national economic development plan and designing this plan combining, in a coherent manner, policies directly or

indirectly linked to mining –for instance: energy, environment, industrial diversification, transfer of technology, transport, competition, infrastructure, etc– and to monitor its implementation. Planning and monitoring strategies that integrate several policy areas and stakeholders require technical and management skills that might need to be developed locally.

C. Preserving the concept of public interest when negotiating the terms on which TNCs operate in the host country.

47. The terms on which TNCs are to exploit natural resources are defined through contractual arrangements with the Government. In this type of arrangements, supply (in terms of access to land and ownership of the business of extraction) is secured for a given period, in exchange of, for instance, a royalty or a profit-based tax.
48. Internal constituencies or NGOs have often criticized governments, for not negotiating such arrangements on better terms since resources are located in their territory and TNCs may only process these if they have access to resources. It is true however that, these countries have the resources but they may lack the technology or know how to process them.
49. A study conducted in 1984¹⁸ revealed that minerals such as cobalt, manganese, chromium and platinum were considered to be “critical” to the American defense industry because they were “not found nor produced domestically in sufficient quantities to meet needs in times of foreign threats to national security and/or the economy”. At that particular moment, during the cold war, these minerals were being extracted in the USSR and Africa only and hence, the US was reliant on the supply of these commodities by Africa.
50. The scope for using mineral resources strategically in terms of increasing the bargaining power of Governments vis à vis TNCs seems more limited nowadays but this topic may be worth exploring further. One of the reasons that may suggest this is the fact that, as TNCs merge into 'mega-corporations', they increase not only their size and range of activities but also their economic power in global economy and locally. In this context, these companies (individually or jointly as corporate lobby groups) are able to exert a great deal of political influence over democratically elected bodies in the pursuit of their own interests, potentially overriding the public interest.
51. Their strategy of “pursuing profitability” as an ultimate objective has lead, in some cases, to “undesirable practices” in developing countries. To cite an

¹⁸ Hagerman, R.A. (1984). U.S. reliance on Africa for strategic minerals. Paper submitted to the Marine Corps Command and Staff College, in partial fulfillment of requirements for written communications. Quantico, Virginia.

example, a number of aluminium producers (including Alcoa and BHP Billiton) have been criticized for their involvement in building dams in Brazil to provide cheap energy for aluminium producers: these dams have displaced people and caused flooding in large places in the forest¹⁹.

52. In this context, developing countries face the challenge of preserving the concept of public interest when negotiating the terms on which TNCs operate in the host country.

D. Monitoring activities and guaranteeing accountability of TNCs

53. It is sometimes hard for individual governments to monitor the activities of TNCs and control their ability to influence people's lives. In recent times, cases such as Enron's have shaken the confidence in public institutions and national authorities to regulate and supervise these actors.
54. Global capital mobility and internationalization of production have led to rising expectations about how these companies conduct their business. The corporate response to these expectations is to promote codes of conduct. These codes are generally formulated by the industry. In some cases other stakeholders, such as Governments representatives and trade unions, are also involved. NGOs may also participate in this process by lobbying TNCs or Governments. Although other stakeholders may participate in the process of formulation, implementation and monitoring is often industry-led.
55. Codes of conduct contain "rules of behaviour" under which TNCs should operate. The purpose of these documents may be to narrow the scope of permissible conduct and the range for bargaining, to guarantee adherence to social and economic objectives of the host country, to abstain from corrupt practices and to disclose information. These codes usually refer to social responsibility, safety, environment and involvement with the community
56. Codes of conduct are self-regulated arrangements without sanctions for non-compliance. This is why the standards set in codes are seen as ineffective because adherence to them is voluntary rather than required. In this context, Governments from developing countries face challenges in guaranteeing that TNCs engaged in natural resource extraction activities provide economic contributions to the society and are environmentally and socially responsible, these objectives being sometimes contradictory with the strategy of pursuit of profitability and cost reduction of these companies.

¹⁹ Switkes, Glenn (2003). "Aluminum dams planned for Amazon put on hold". World Rivers Review, vol. 18 N° 3. Available at: <http://www.irn.org/pubs/wrr/issues/WRR.V18.N3.pdf>

E. Ensuring that investment flows arrive

57. The importance of investment in the mining sector lies in the fact production capacity is a function of investment funds to maintain production and exploration. Besides this, receiving investment by means of TNCs operations can act as a source of technological and skill transfers to developing countries.
58. In recent years, the return to more dynamic growth in demand for minerals and metals has fuelled renewed interest in exploration and investment in new production facilities. During the fourth quarter of 2004, 45 new mining investment projects were announced, totalling more than US\$ 6 billion. Overall, the total investment figure shows a 15% increase over the figures reported in October 2003 and is a direct consequence of the improved investment climate prevailing during 2004²⁰.
59. Most of the global investment has focused in copper, gold and iron ore and to a lesser extent in nickel, zinc and lead. Investment focused on increasing supply capacity in existing projects to respond to demand growth and on ownership changes (mergers and acquisitions) as opposed to developing new projects. The number of new mines under construction should increase substantially as metal prices increase.
60. A recent trend that is worth noting is Asian investment. Asian companies (in particular Chinese and Indian) have embarked on a strategy of securing raw materials supply through direct investments in mines and metals production in other countries, in particular in Latin America.
61. FDI is concentrated in a handful of developing countries: forty countries receive an unchanged 95% of the total allocated to the developing world. The region that has been attracting more investment during recent years is Latin America, followed by Oceania (Australia, Papua New Guinea). The list of most attractive developing countries for mining investment include Peru, South Africa, Brazil, Mexico, China and Argentina²¹. Although Africa is geologically well endowed, it is still attracting little exploration expenditure. In spite of that, its share is expected to increase²². Investment flows seldom reach the poorest developing countries: in the case of LDCs, FDI remains considerably smaller than official development assistance²³.

²⁰ Ericsson, Magnus (2005). "Industry registers record investment". Engineering and Mining Journal January/February 2005.

²¹ See Ericsson, op. cit. (p. 16)

²² UNCTAD (2004). New take-off predicted for FDI: findings of a joint UNCTAD-corporate location survey of international location experts. Press release N° UNCTAD/Press/PR/2004/005.

²³ UNCTAD (2003). Book review: World Investment Report 2002: Transnational Corporations and Export Competitiveness.

62. Developing countries compete among themselves to attract investment in minerals, which they hope will catalyze broad processes of economic development. In order to attract investment in mining projects developing countries have liberalized their investment environment and put in place several incentives such as: tax holidays, special corporate tax rates for TNCs, removal of import duties; 100% foreign ownership and repatriation of profits, removal of the need to employ local contractors and the granting of extensive land, water and other concessions. TNCs have many countries and incentives to choose from.
63. These incentives have not always yielded the expected results. In a study carried out in 2000²⁴, Miria Pigato analyzed the revenue loss caused by tax holiday regimes in Africa and its modest impact in attracting investment and retaining investors. According to her, extractive and other resource activities provide potentially high rents and hence do not require fiscal incentives to attract FDI. She suggests harmonizing incentives and tax regimes in Africa, in line with development objectives to improve investment attraction.
64. Local communities have also criticized, from the perspective of sovereignty, the scope of concessions given to TNCs in the mining industry in order to attract investment²⁵. They have raised doubts on whether investment received under foreign ownership of mineral resources development can really contribute to the development of host economies.

F. Ensuring that investment flows contribute to development

65. FDI might contribute to a development or poverty alleviation strategy through job creation, transfer of technology (including management skills), raising productivity and enhancing export capacity but an increase in investment may not necessarily deliver these.
66. Guaranteeing spillover effects of investment to other sectors of the economy is particularly relevant in extractive industries, taking into account their enclave nature.

1. By becoming a supplier to TNCs

67. As mentioned before, mineral and metal markets were exposed to early globalization and this fact induced the cost homogeneity that prevails nowadays. Indeed, reforms oriented to liberalize trade and investment regimes during the last two decades changed some aspects of the strategies pursued by TNCs²⁶, for

²⁴ Pigato, Miria (2001). The Foreign Direct Investment in Africa. African Region Working Paper Series N° 15. World Bank.

²⁵ Bolivia : nueva oleada de protestas : intentan anular renacionalización de la mina Caracoles. Econoticias. Com (24-05-04).

²⁶ See Pigato, op. cit. (p. 17)

instance with regards to outsourcing. In the case of mining TNCs and in a context characterized by an increasing number of mergers and acquisitions, a wide range of corporate functions may be relocated in the host country, opening opportunities to local companies that may supply TNCs with goods and services²⁷.

68. However, becoming a supplier to a leading TNC is not an easy task: it requires the capacity to meet stringent demands in terms of cost, quality and timely delivery. This situation often leads foreign affiliates in globally oriented industries to use other TNCs as suppliers rather than to rely on domestic sources. This means that very little transfer of technology takes place and that less income is generated in the host developing country.
69. In this context, many developing countries face the challenge of promoting local capabilities and skills required to be a competitive supplier in the mining value chain, for example technical, management (planning and monitoring) and marketing capabilities.

2. By pursuing active policies to promote skill creation and transfer of technology

70. These capabilities and skills can be built by creating structural linkages between foreign investors and the local supply chain. To build those linkages, developing country governments need to design a national development strategy based on objectives and align policies and instruments with these. The choice of instruments may vary according to the objectives but also because of an assessment of the local context in which these will be implemented.
71. Some policies and instruments may, for instance pursue, the objective of facilitating transfer of technology from TNCs to local mining companies in order to be able to add value to mineral commodities (transferring technical know how) and provide services that may be outsourced in the host country (transferring managerial skills). Others type of instruments may pursue increasing the value of mineral commodities processed locally or diversify the production base on the basis of mineral revenues. Competitiveness in domestic firms can further be developed by policies and instruments intended to promote research and creation of clusters that would create links between business and the science and research base.
72. Investments in the extractive sector, in the case of Africa, have resulted in very little or no forward and backward linkages and value addition due to the high offshore retention and lack of processing. In order to overcome this problem in

²⁷ UNCTAD (2004). World Investment Report 2004: The shift towards services (Overview). United Nations, New York and Geneva.

- the future, Miria Pigato suggested²⁸ to establish an African regional network to integrate industrial and services activities to “improve the quality” of FDI.
73. Nevertheless, there are increasing limitations to the policy instruments developing country governments can use to promote skill creation and transfer of technology. For instance policy guidelines or recommendations from international financial institutions in the mining sector may include scrapping or removal of restrictions on foreign ownership, full access to natural resources, reduced tariffs and taxes, the relaxation of environmental and social regulations, and full payment of royalties for and the protection of intellectual property rights with respect to the mining technologies used.
74. In the context of the WTO, several agreements contain provisions that prohibit the use of certain instruments. For instance, the Agreement on Trade-Related Investment Measures (TRIMS) prohibits establishing requirements related to the procurement of goods through local production and limiting imported inputs for production. The Agreement on Subsidies and Countervailing Measures (SCM) prohibits certain types of finance mechanisms that are targeted to a specific sector.

V. CONCLUSIONS AND RECOMMENDATIONS

75. Although mineral commodities are not only located in the territory of developing countries, the specialization pattern in production and exports show that many developing countries are major producers and exporters of mineral commodities and intermediate outputs derived from these commodities while developed countries are major producers and exporters of semi-factures.
76. Extracting and processing mineral commodities through large-scale mining raise concerns related to environmental effects, social implications and economic performance. In view of these concerns, there has been evidence of declining public trust in the mining and minerals processing industries and questioning the contribution mineral commodities to development.
77. The production process involved in large-scale mining is intensive in capital and requires significant investments to pursue exploration and exploitation. In view of this situation, the cost structure contains high fixed costs. In view of the significant barriers to entry in this industry, TNCs are key players in this sector. These companies are vertically integrated in all stages of the production chain, they have worldwide operations and their operations are guided by the principles of cost reduction and improving profitability. During the last decade, these actors have increased consolidation and vertical integration in many extracting and refining sectors.

²⁸ See Pigato, *op. cit.* (p. 17)

78. In this context, developing countries with deposits of mineral commodities are faced with several challenges. The first challenge is entering and remaining competitive in the business of processing and trading their resources. Taking into account that TNCs have greater resources, in many cases, domestic mining industries cannot effectively compete with them.
79. The second challenge is designing policies that would use the mining sector as a basis to foster a broader development strategy. Such policies should ensure that the mining industry is regulated and that its activities are consistent with a strategic national development plan and involve different stakeholders directly or indirectly related to the mining sector. In view of social, environmental and economic concerns associated with mining, developing country policymakers may be faced with often-conflicting priorities and objectives when designing policies to promote development through large-scale mining.
80. A strategic national development plan should refer to a long-term perspective and provide a framework that will take into account both present and future, economic, environmental and social needs. In order to the challenge mentioned in the previous paragraph, we recommend that, when this plan is designed, investment in the large-scale mining be contextualized in terms of the contribution it can make to the development process.
81. In this sense, mineral resources are to be exploited to the extent that such exploitation is environmentally sustainable; provides economic and social benefits to the host country and the local communities surrounding the mining site and that it does not affect the cultural and territorial rights of indigenous communities adversely. To ensure that mining activities take only place to the extent that is sustainable, mineral resource plans should be prepared and complied with and the impact of expanding large-scale mining should be assessed before starting operations.
82. The third challenge is preserving the concept of public interest when negotiating the terms on which TNCs will operate in the host country. As corporate interests and public interest may not always coincide, internal constituencies or NGOs have often criticized governments for not negotiating such arrangements on better terms. However, as TNCs merge in “mega corporations”, they increase their economic power and the capacity to exert political influence on democratically elected bodies.
83. In order to face this challenge, developing country policymakers may wish to consider requesting that cleaner production technologies for all types of mining activities are provided at low cost. They may also wish to request that integrated social and environmental social management plans be developed between TNCs, the host government and affected local communities. These management plans

- may include, for instance, impact mitigation and remediation measures of activities at all stages of the production process, from exploration, development, closure to rehabilitation.
84. The fourth challenge is monitoring activities and guaranteeing accountability of TNCs and it is related to the difficulties individual governments face to regulate and supervise the activities of TNCs. The corporate response to increasing expectations of civil society on the way the mining business is conducted is to promote codes of conduct that are often related to social responsibility and the environment. Codes of conduct do not include sanctions for non-compliance.
85. Despite this fact, it is advisable to implement, at the local level, health and environmental monitoring schemes. All relevant stakeholders, including affected community and local authorities should participate in these schemes.
86. There is no international forum or organization where the activities of TNCs transnational are regulated or monitored with a view to prevent abusive practices. UNCTAD had a unit to monitor issues related TNCs –for instance market share and practices- but it disappeared. Some instances in international organizations (for instance in the Human Rights Commission and the International Labour Organization –ILO-) provide the opportunity to voice concerns related to the compliance, of mining companies, with domestic laws providing for safeguards against occupational safety and health hazards or prohibiting child labour.
87. In the context of TNCs operations, investment is important for developing countries because it may constitute an important source of financial technological and skill transfers. From this perspective, developing countries face the challenge of ensuring that investment flows arrive. Developing countries compete among themselves to attract FDI by providing increasing incentives. These incentives have not always yielded the expected results and mining-related FDI tends to remain concentrated in a few of them.
88. In a context of increasing incentives to attract investment and of foreign ownership of mineral resource development, civil society in developing countries have often raised doubts related to the capacity of mining investment to contribute to development. Ensuring that investment flows contribute to development entails two challenging tasks: from the perspective of local companies, becoming a supplier of TNCs and, from the perspective of the government, pursuing active policies to develop skills and transfer of technology.
89. In this context, developing countries should be particularly vigilant when monitoring multilateral, regional or bilateral negotiations from the perspective of rules that could have an impact in their capacity to implement policies they are currently using or intend to use in the future to promote development. Their participation in these negotiations should be guided by the goal of preserving such capacity.

ANNEX I

Table 4: Top 10 companies in world metal mining in 2003

	NAME	COUNTRY	EXTRACTION	SHARE OF WORLD MINE PRODUCTION	STAGES OF THE CHAIN IN WHICH THIS COMPANY IS INVOLVED
1	Anglo America plc	UK	Coal, platinum group metals, diamonds, copper nickel, mineral sands, construction materials iron ore, chrome, manganese, carbon steel and vanadium	6,7 %	<ul style="list-style-type: none"> ▪ Exploration (R&D oriented) ▪ Mining ▪ Processing (Refining into metals) ▪ Global marketing
2	BHP Billiton Group	Australia	Aluminium, base metals, carbon, steel, diamonds	3,9 %	<ul style="list-style-type: none"> ▪ Exploration ▪ Mining ▪ Processing ▪ Global marketing
3	Rio Tinto	UK	Iron ore, aluminium, copper, diamonds, industrial minerals	3,8%	<ul style="list-style-type: none"> ▪ Exploration (R&D oriented) ▪ Mining ▪ Processing ▪ Global Marketing
4	Norilsk Nickel	Russia	nickel, copper, cobalt, palladium, platinum and other precious metals (gold, silver), selenium, tellurium, technical sulphur, hard coal	3,1%	<ul style="list-style-type: none"> ▪ Exploration ▪ Mining, ▪ Processing ▪ Global marketing
5	Cia Vale do Rio Dolce	Brazil	Iron ore and pellets, manganese and iron alloys, copper, potassium kaolin	2,9%	<ul style="list-style-type: none"> ▪ Exploration (R&D oriented) ▪ Mining ▪ Processing ▪ Global Marketing ▪ Logistics

	NAME	COUNTRY	EXTRACTION	SHARE OF WORLD MINE PRODUCTION	STAGES OF THE CHAIN IN WHICH THIS COMPANY IS INVOLVED
6	Corporación Nacional del Cobre de Chile	Chile	Copper, molybdenum	2,1%	<ul style="list-style-type: none"> ▪ Exploration ▪ Mining ▪ Processing ▪ Global Marketing
7	Newmont Mining Corp.	USA	Gold, Zinc, Copper	2,0%	<ul style="list-style-type: none"> ▪ Exploration (R&D oriented) ▪ Mining ▪ Processing ▪ Global Marketing
8	Noranda Inc.	Canada	Precious metals, lead, copper, zinc, aluminium, magnesium, nickel	1,4%	<ul style="list-style-type: none"> ▪ Exploration (R&D oriented) ▪ Mining ▪ Processing ▪ Recycling ▪ Global Marketing
9	Barrick Gold Corp	Canada	Gold, nickel	1,3%	<ul style="list-style-type: none"> ▪ Exploration (R&D oriented) ▪ Mining ▪ Processing
10	Phelps Dodge Corp	USA	Copper, molybdenum, gold, silver, rhenium	1,3%	<ul style="list-style-type: none"> ▪ Exploration ▪ Mining ▪ Processing (R&D oriented) ▪ Producing semi-manufactures (wire, cable, engineered materials)
TOTAL 10 LARGEST				28,5%	

Sources: Raw materials Group Website²⁹ and websites of these companies

²⁹ Raw Materials Group. Top 10 Companies in world metal mining in 2003. Available at: <http://www.rawmaterialsgroup.com/Doc-PDF/RMGTop10.pdf>

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