3 Part Three: Risk Assessment

An in-migration risk assessment can help answer the following questions:

- What is the probability of in-migration?
- What is the risk of influx-induced environmental and social impacts?

Once risks are identified, a situation analysis helps analyze the potential location and project-specific expression of the phenomenon. The situation analysis helps clarify:

- **Migration pathways and concentration points;**
- **Key environmental and social impacts; and**
- **Key health risks.**
- **Stakeholder identification and analysis.**

Introduction

This section describes the basis for assessing the probability of project-induced in-migration. Where the probability is found to be moderate-high, it is recommended that the project conduct a situation analysis to understand the probable physical expression and environmental and social impacts of in-migration.

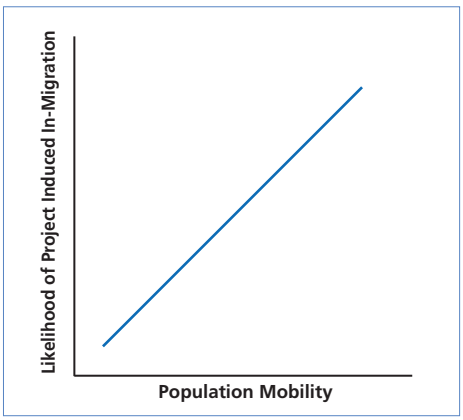
ASSESSING THE PROBABILITY OF PROJECT-INDUCED IN-MIGRATION

In assessing whether or not a project should be concerned with the risks of project-induced in-migration, one must first determine the probability of its occurrence. The probability of project-induced in-migration can be predicted on the basis of three factors:

- Existence of a mobile population;
- Characteristics of the project; and
- Capacity of the area to meet project needs.

POPULATION MOBILITY

Population mobility is a key indicator for the probability of spontaneous migration. Analysis of potential mobility should occur at a regional, national, and, where appropriate, international level. At the regional and national levels, various economic, social, and demographic indicators can be used to assess the relative mobility of the population.

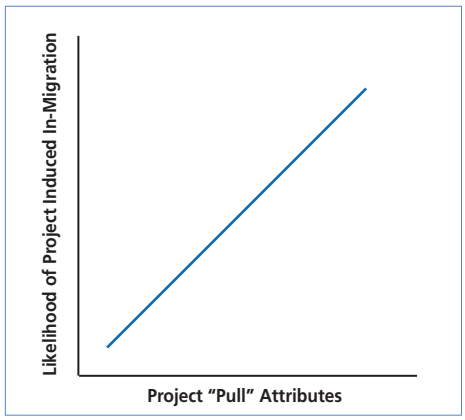


In general terms, countries and regions with a significant rural population practicing and reliant upon agricultural subsistence-based livelihoods, high unemployment and under-employment, highly concentrated development, and a low per capita GDP are likely to experience high levels of internal migration toward economic opportunity. Projects bordering countries with such characteristics may also experience international cross-border movement. Finally, in countries with internally displaced people or where projects border countries where factors are causing displacement (e.g., natural calamities, civil war, ethnic conflict), the in-migration phenomenon may be exacerbated.

It is unlikely that any one project presents the first potential opportunity for regional or national migration. Therefore, an analysis of the influx phenomena experienced by recent projects, together with an overview of the recent history of regional development, can provide useful local information to supplement conclusions reached from the indicators described above.

PROJECT CHARACTERISTICS

In this context, "project characteristics" refers to core project attributes, rather than implementation strategy and approaches. The unit of analysis to evaluate the risk of project-induced in-migration is the entire project, comprising the various stages of construction and the project as defined when it becomes operational. This includes phased project construction involving multiple base camps, which are operated either in sequence or in parallel and which may be relocated during the construction phase, especially linear projects such as roads, transmission lines, and pipelines.

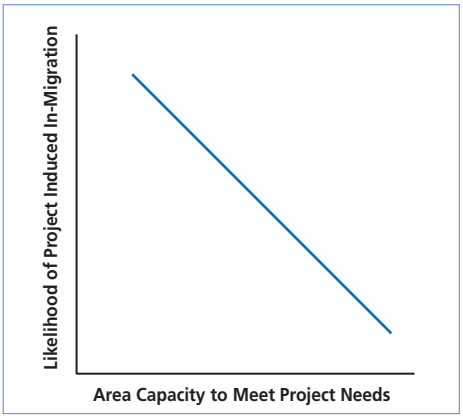


In addition, multi-local projects in which facilities and/or associated facilities are located in separate geographical areas – such as gas projects where the infrastructure and operation of extraction, processing, and transport are distant from one another, or infrastructure projects involving road development, transmission lines, etc. with multiple bases - are more complex, in that they may be associated with multiple locations with "pull" factors, and may thus have multiple points of in-migration. Each location should be separately characterized in terms of the probability of in-migration and potential negative environmental and social impacts.

The main "pull" factors associated with the project relate to the demand for labor and goods and services. Both the level and duration of such demand should be considered. In general, high construction and operations phase labor requirements are likely to exceed local capacity to meet needs, and therefore both rely on and demand in-migration. Extended construction phases with high labor demand are associated with a longer construction phase demand for goods and services by the local population. As such both the demand for labor and goods and services provides the basis for higher levels of in-migration, longer periods of residence and ultimately higher levels of dependency and investment. Similarly, high operations phase demand for labor and goods and services provides the basis for ongoing in-migration, investment, and ultimately project-dependent development within the project area. In the oil, gas and mining sector high operations phase demand for goods and services typically relies on the development and use of proximate service centers or the creation of new centers.

Significant and ongoing compensation royalty payments can also be a significant "pull" factor for in-migration. As indicated in Part One, it is common to see compensation-royalty sub-economies, whereby representative leaders draw political and financial strength from payment of compensation and royalties and control of their distribution.

AREA CAPACITY TO MEET PROJECT NEEDS



Each project has defined needs, including the construction and operations phase workforce requirements, the construction and operations phase demand for goods and services, and specific requirements regarding infrastructure, services, and utilities (see Table 4 for indicators of local capacity to meet these needs). High levels of demand may exceed local capacity to meet such demand and thus provide the basis for in-migration.

The area capacity to meet the requirements for infrastructure, services, and utilities is relevant insofar as project development in areas without adequate capacity will require project investment to strengthen them. The selected development strategy and the improved local capacity may then serve to attract in-migrants and stimulate further economic development that supports additional in-migration. These risks should be considered in project design.

TABLE 4: INDICATORS OF LOCAL CAPACITY TO MEET IDENTIFIED PROJECT NEEDS

Project Need	Indicators of Local Capacity to Meet Identified Need
Construction and operations phase workforce requirements	• Total population • Population density • Capacity of the local population (education, skills, experience)
Construction and operations phase demand for goods and services	• Presence of economic centers • Sectoral activity with common demands • Existence of small and medium enterprises with adequate capacity to meet demand
Specific requirements regarding infrastructure, services, and utilities	• Access • Transportation • Communication • Health, education • Water, electricity, sanitation and waste disposal

ASSESSMENT TOOL: PROBABILITY OF PROJECT-INDUCED IN-MIGRATION

Table 5 presents key indicators for each of the factors identified as contributing to the probability of project-induced in-migration. For each indicator, a range of measures is provided.

The results of the probability assessment will be an identified low, medium or high probability of in-migration. The probability of influx will be greatest for projects being developed in countries with high population mobility, for projects which have high "pull" factors associated with their development and operations, and for areas with a limited capacity to meet project needs. The results of the probability analysis should be used as an input into the next step, namely assessing the likelihood of in-migration induced changes in the project context and the risks that these pose to the project.

TABLE 5: ASSESSING THE PROBABILITY OF PROJECT-INDUCED IN-MIGRATION

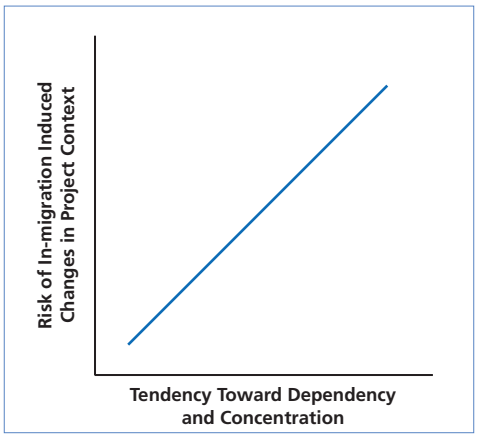
Factor	Indicators	Level Low/High or Yes/No	
Population Mobility (probability of spontaneous migration)	National and regional working age population	L	H
	Level of un- and under-employment	L	H
	Per capita GDP	L	H
	Occurrence of internally displaced persons	N	Y
	Proximity to neighboring countries with factors	N	Y
	Occurrence of project-induced in-migration on similar projects	N	Y
Project Characteristics	Direct and indirect construction phase labor requirements including skill levels (unskilled, semi-skilled, skilled), duration, etc.	L	H
	Direct and indirect operations phase labor requirements including skill levels, duration, etc.	L	H
	Construction phase demand for goods and services	L	H
	Operations phase demand for goods and services	L	H
	Increase in access and availability of infrastructure (roads, wharves), services (transportation, education and health), and utilities (water and sanitation, electricity) – as part of project development	N	Y
	Increase in access and availability of resources for third parties (ASM, timber and NTFP, agricultural and marine produce)	N	Y
	Opportunities for land speculation associated with project development, e.g., phased land take	N	Y
Area Capacity to Meet Project Needs	Working age population	H	L
	Capacity of working age population (education, skills, experience)	H	L
	Adequacy of infrastructure, services, and utilities	L	H
	Availability of goods and services	L	H
	Capacity of SME	L	H

ASSESSING THE RISK OF MIGRATION-INDUCED CHANGES IN THE PROJECT CONTEXT

This section considers the risk of migration-induced changes in the project context. Whether or not in-migration poses a risk to the project and its "host" communities is deemed to be the result of a combination of factors that consider its footprint, the relative rate and magnitude of in-migration, and the capacity of the area to absorb a growing population. Four factors that determine the potential likelihood of influx-induced impacts on the project context have been identified. These are:

- Tendency toward dependency and concentration (influx footprint);
- Relative rate and magnitude of in-migration;
- Assimilative capacity of the project area (as a whole and in the most heavily settled areas);
- Various site-, region- and nation-specific factors.

TENDENCY TOWARD DEPENDENCY AND CONCENTRATION

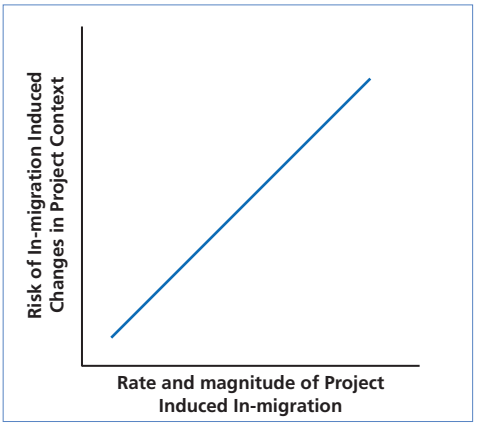


The tendency toward dependency considers the medium- and long-term economic relationship between the project and the project area. Areas with integrated economies are characterized by high levels of economic activity either within a sector or across sectors, and have established infrastructure, services, and utilities. Such areas are more likely to have established economic centers and also provide greater employment opportunities for a local and migrant population. These centers combine with greater regional employment opportunities to absorb and dissipate the tendency toward concentration by diffusing the population over a larger area and a broader economic base. In contrast, where projects are developed in remote areas, they tend to become the "economic base" upon which the local (and to a lesser extent the regional) economy depends. They function as insulated or enclave micro-economies, and subsequent development often is centered upon the project itself.

The tendency toward concentration considers the likely pattern of settlement of an influx population. Experience demonstrates that migrants correlate proximity to the project site with opportunity, and so the existence of villages, towns, and cities proximate to project areas, the ease of access, and the availability of adequate transportation services help define the local influx footprint.

For projects located in rural areas, the migrant population tends to be concentrated in new settlements, villages and towns in the immediate vicinity of the project. Projects located close to larger urban populations tend not to be associated with specific influx footprints, as the incoming population is absorbed within the city - although that is not to say that there are no impacts.

RATE AND MAGNITUDE OF PROJECT-INDUCED IN-MIGRATION



Assessment of the risk that high rates and large numbers of in-migrants pose to the host communities and the project requires consideration of relative numbers throughout the project life cycle, and an informed judgment regarding the assimilative capacity of the area. For example, in absolute terms the arrival of 1,000 migrants is a more significant event for a village of 200 people, than for a small town with 10,000-30,000 residents. Further, what is of interest may not necessarily be the absolute or relative number but the rate of change. Where change happens at a slow-moderate pace and the absolute numbers do not overwhelm the host community environment, it is more likely that the incoming population will be assimilated in the milieu and/or the environment will have the time to adapt to the growing population.

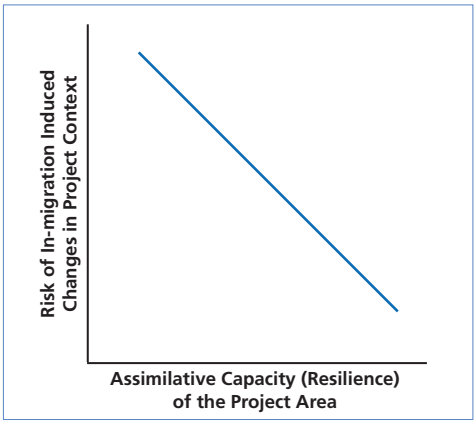
While the importance of rate and magnitude of in-migration and assimilative capacity can be described conceptually, the difficulty lies in developing project- and context-specific analyses. Reference to in-migration phenomena experienced by other projects in similar settings may be a useful guide. It is also recommended that a low, medium and high in-migration scenario be developed. Table 6 presents an example of such an analysis for the mining sector. The example is developed using information presented in Part 2 which indicates that every formal job within the mine creates between three to ten additional jobs in the project area. These scenarios should be used in the situation analysis to explore the full range of potential impacts, identify priorities, guide monitoring, etc

Highest population growth rates and absolute changes in population are typically associated with the project construction phase. Nonetheless, sustained growth rates and development of insulated economies are often observed with extractive industry sector projects.

TABLE 6. HYPOTHETICAL IN-MIGRATION SCENARIOS IN THE MINING SECTOR

No	Phase	Workforce	In-migration Scenario		
			Low (x3)	Medium (x6)	High (x10)
1	Construction	10,000	30,000	60,000	100,000
2	Operation	7,000	21,000	42,000	70,000

ASSIMILATIVE CAPACITY (RESILIENCE) OF THE PROJECT AREA



The assimilative capacity of an area is defined as the rate and nature of project-induced increases in population that an area can absorb without development of significant adverse environmental and social impacts. The assimilative capacity of an area is a measure of its resilience, and both the impact of project development and of project-induced in-migration can be analyzed in terms of the area's resilience.[1] To do so requires identification of indicators of resilience.

With regard to in-migration, indicators of the resilience of an area include:

- Ability of physical resources to accommodate increased resource use without degradation. While this concept is primarily applicable to physical resources, it can also be applied to current livelihood systems;
- Ability of infrastructure, services and utilities to meet the needs of higher levels of demand associated with a larger population; and
- Various social factors: politics, the strength and capacity of government, the level of economic development, security risks, health risks, and socio-cultural factors, such as the degree of insularity or acceptance of newcomers and ownership or other rights over land and other resources.

Table 7 presents some examples of the application of these concepts.

Concentrated rapid population growth often exceeds the assimilative capacity of the host communities and physical environment. It is during these periods, whether they occur during construction or operation that a project needs to manage excessively high rates of in-migration and population growth within the project area of operations.

1 Resilience is defined as the persistence of a system and its capacity to absorb change and still maintain the same relationships within the system.

TABLE 7. UNDERSTANDING THE RESILIENCE OF THE PROJECT AREA

	Aspect of Resilience	Example
1	Physical Resources	If the resident population of an area is dependent on various surface-level sources of water, the dry season flows will determine the population that can be sustained. If in-migration causes population growth over and above that which can be sustained, alternative sources of water will be developed and exploited. Typically this involves development of wells and boreholes tapping into aquifers (the latter with an unknown capacity and resilience).
		Land availability, productivity and degradation determine agricultural production. Where surplus land is available, an influx population may encourage expansion of the area under cultivation (assuming labor is available). Unsustainable land use may lead to degradation and declining productivity and production, e.g., reduction of rotation of productive and fallow land leading to loss of soil fertility. If labor is unavailable, an influx population may increase demands on food supplies without contributing to increased production. Another common example is higher levels of fuelwood use leading to depletion of fuelwood reserves.
2	Infrastructure, services and utilities	Objective standards exist for the provision of health, education and waste management services. In rural and remote areas of many countries, these standards are often not achieved even prior to the arrival of a project. The arrival of an influx population may threaten the delivery of services.
		The capacity of infrastructure and utilities is defined in design, i.e. roads designed to accommodate intensity and type of traffic, electricity generation for X households, adequacy of water supplies for X households, capacity of sanitation systems for X households, etc. Project use as well as the arrival of an influx population may threaten the adequacy of the infrastructure, services and utilities.
		The surplus capacity of communities in terms of housing, water and sanitation, waste management, and supply of goods and services can be described in a quantitative and/or qualitative fashion. Where surplus capacity is limited, in-migration often leads to the development of squatter settlements and associated deleterious effects on community economy, health, social environment, and infrastructure, services, and utilities.
3	Economic and social factors	Integrated economies are more resilient than enclave micro-economies.
		Indigenous peoples are less resilient than mainstream society.
		Relationship between cultures within the project area and mainstream society.

OTHER SPECIFIC FACTORS

There may also be site, regional, national or international factors that affect the potential influx impact on the project context. Examples of such factors include:

- Potential for cross-border migration, including involuntary migration and any associated risk, such as import of negative influences from conflict-affected areas;
- Ethnic/tribal relations and any recent history of conflict;
- Existence of ethnic groups with particular trade skills and/or high mobility;
- Distribution of vectors and diseases and risk of transfer from areas of high incidence to other areas; and
- Existence of large, mobile populations of ASMs; recognized problems with small-scale illegal logging.

Where any one of these factors is recognized to exist, this serves as a red flag identifying the likelihood of a specific impact that may need to be addressed irrespective of the overall probability of influx and other factors relevant to the analysis of the influx-induced changes in the project context. For example: (i) in an area with known risks of transfer of recognized vectors and diseases, a low probability of in-migration may be associated with potentially medium-high risks of health impacts associated with project induced in-migration; (ii) in regions where there has been a recent history of ethnic tension and violence the probability of any in-migration should be a matter of concern as it may serve to exacerbate existing problems.

ASSESSMENT TOOL: THE PROBABILITY OF INFLUX IMPACTS ON THE PROJECT CONTEXT

Table 8 presents a summary of the key indicators associated with each of the factors identified as contributing to the likelihood of influx-induced changes in the project context.

Consideration of these factors will provide an overall assessment of the risk of in-migration induced change in the project context. This risk should be defined as low, medium or high. Highest risks will be associated with projects developed in areas where there is a high likelihood of concentration and dependency, where there are sustained high rates of in-migration and where the host area has a low assimilative capacity.

Projects with high construction and operations phase labor requirements and an ongoing demand for goods and services that are located in remote regions with low population densities, distance from major population centers, and limited economic activity/diversity of economic alternatives are typically associated with high rates of in-migration that exceed the assimilative capacity of the project area. However, it is important to capture the importance of these factors in less extreme contexts. For example, project development proximate to smaller cities and towns may induce high levels of in-migration that are not immediately obvious, as the assimilative capacity of the city/town is larger than that of remote, rural, isolated areas. Finally, as noted in the previous section, the relationship between in-migration and the epidemiology of disease needs separate consideration. Table 9 outlines the recommended actions for the different risk levels a project may encounter.

TABLE 8: ASSESSING THE PROJECT SPECIFIC RISKS CAUSED BY PROJECT-INDUCED IN-MIGRATION

Factor	Indicators	Level	
Tendency Toward Dependency and Concentration	Level and distribution of infrastructure, services, and utilities	L	H
	Level and distribution of general economic activity (goods and services)	L	H
	Level and distribution of sector specific economic activity	L	H
Assimilative Capacity of Area	Nature of settlements nearest to project site (village, town, city)		
	Existence and capacity of public infrastructure, services, and utilities (including health, education, transportation, water and sanitation, electricity)		
	Strength of local and regional government administration		
	Existence and application of local laws and regulations		
	Existence of regional development plan		
	Existence of urban development plans		
	Physical space for additional habitation		
	Health and security risks		
	Socio-cultural factors relating to integration of migrants and response to rapid changes in household incomes		
Rate of In-Migration and Magnitude of In-Migration	In-migration phenomena experienced by projects in the same sector and in the same context		
	Development of low-, medium- and high- in-migration scenarios		
Specific Factors	Potential for cross-border migration and any associated risk	N	Y
	Ethnic/tribal relations and any recent history of conflict	N	Y
	Existence of ethnic groups with particular trade skills, high mobility, etc.	N	Y
	Distribution of vectors and diseases and risk of transfer from areas of high incidence to other areas, etc.	N	Y
	Existence of large mobile populations of ASMs	N	Y

Note: No alternative levels have been provided for the individual factors comprising Assimilative Capacity of Area, as these factors do not lend themselves to such analysis. Informed judgments, based on collection of primary and secondary data, are required to provide answers to these questions. The factors identified for the Rate of In-Migration and Magnitude of In-migration describe actions for the review and analysis of existing in-migration phenomena and development of low, medium and high migration scenarios.

TABLE 9. RISK LEVELS AND RECOMMENDED ACTIONS

Risk Level	Recommended Action
Low risk	Minimum complement of good practice measures
Moderate to high	Comprehensive situation analysis
Low risk but high probability of specific adverse impacts	Focused, issue-specific situation analysis
In-migration and impacts already evident	Risk assessment and comprehensive situation analysis

SITUATION ANALYSIS FOR ASSESSING RISK AND IDENTIFYING MANAGEMENT OPTIONS

OUTLINE OF A SITUATION ANALYSIS

The previous section defined the probability of in-migration and the risk of in-migration induced changes in the project context. Recognition that in-migration is likely to occur and that it has the potential to cause changes in the project context now needs to be followed up with a more in-depth situation analysis providing the basis for understanding the likely pattern of development of the in-migration phenomenon, and identifying its most significant potential environmental and social impacts. This analysis will inform decisions about the management options, and is an integral component of an influx management strategy/plan (IMP).

Although a situation analysis can be conducted whenever project-induced in-migration is recognized as a risk or a problem, early recognition of the potential problem, implementation of a situation analysis, and development of an influx management strategy allow for a greater range of management approaches and component interventions.

A situation analysis should include:

1. A **review of national laws** pertaining to internal migration, population registration, etc.
2. A **review of comparable projects** at various stages of development where project-induced in-migration is or has been an issue. This review should assess the potential for, key drivers, and impacts associated with, project-induced in-migration at each project.
3. A **description of the project**, including:
   - The project, logistical bases, and associated facilities and the extent to which the project is required to develop additional infrastructure, services, and utilities;
   - The project development schedule;
   - Construction phase workforce requirements, and demand for goods and services; and
   - Operations phase workforce requirements, and demand for goods and services.
4. A **description of the project context**, including:
   - Local and regional biophysical and socioeconomic context;
   - Assessment of local and regional development; and
   - Review of sectoral analyses (where available); and
   - Review of capacity of local and regional government, infrastructure, services, and utilities.
5. A **description and analysis of the current status of project-induced in-migration**, including an analysis of the dynamics of in-migration and its environmental and social impacts.
6. An **assessment of the predicted routes** for project-induced in-migration.
7. An assessment of the key expected **environmental and social impacts**.
8. Identification and assessment of **relevant stakeholders**.
9. **Identification of potential project- and/or government-led approaches and interventions** for addressing project-induced in-migration, assessment of the relationship of potential approaches with key project variables such as cost, schedule, or existing programs, and recommendations regarding their integration into the project.

Within this analysis, regional and sectoral assessments have multiple uses, including assessing the relative importance of the proposed project in the local and regional economy and the extent to which the proposed project may come to dominate local and regional development. They can also determine the extent to which the project is required to develop additional infrastructure, services, and utilities, the potential impacts such development may have on further economic development and in-migration and in this way suggest possible development strategies. Finally, regional and sectoral assessments can also evaluate the potential to coordinate project and local and regional development, the number of industry players operating in the region, and the extent to which they have shared interests, such as workforce, vocational training, or procurement of goods and services.

THE PATTERN OF PROJECT-INDUCED IN-MIGRATION – IDENTIFYING IN-MIGRATION "HOTSPOTS"

Assessment of the probable pattern of project-induced in-migration is one component of the situation analysis. Such an assessment should utilize information on:

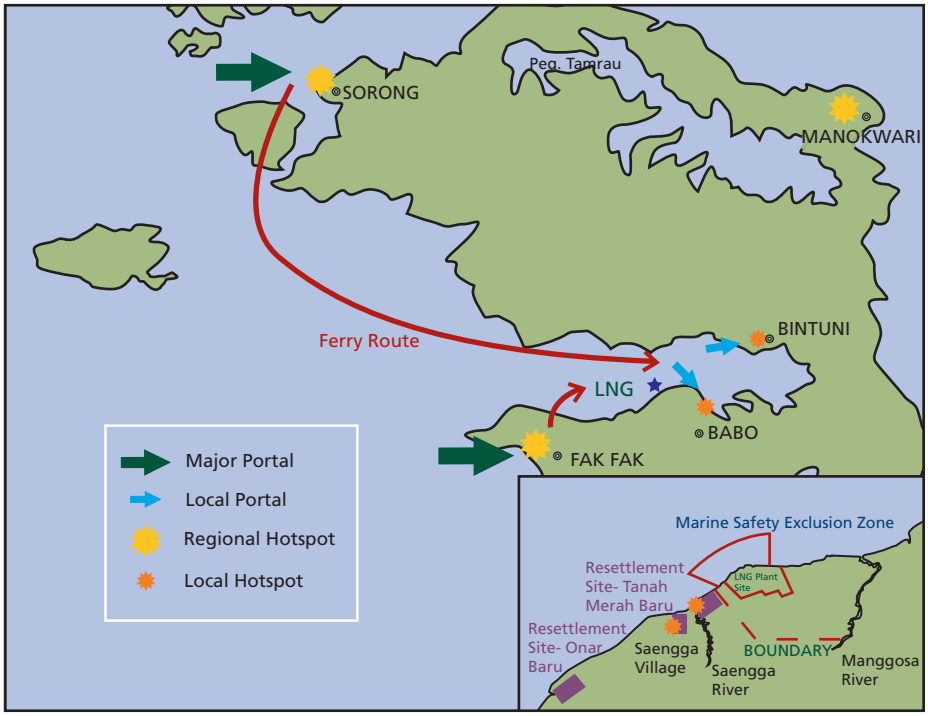
- Access routes to major regional centers;
- Access routes from regional centers to project area;
- Existence of towns, villages;
- Transport infrastructure within the project area;
- Existing/proposed access routes to be used by the project;
- Existing/proposed project logistics centers to be used by the project; and
- Construction plans involving multiple base camps operated in sequence or in parallel, and multiple
- Multi-local activities spread over different human/ecological zones.

Once data is in hand, the information can be readily presented diagrammatically (see Figures 5-7 for examples). In cases where the project is multi-local and has facilities and/or associated facilities distributed over a wide geographical area, the same analysis needs to be repeated for every facility in each geographically distinct location. The analysis should lead to the identification of "in-migration hotspots" - the likely destination/s of in-migrants - that need to be protected from, and prepared for, an expected wave of project-induced in-migration.

Example 1: The BP Tangguh LNG Project, Papua, Indonesia

The BP Tangguh LNG Project is being developed in a remote, relatively inaccessible part of the Bird's Head of Papua, Indonesia. The main point of entry to the Bird's Head (and Papua in general) is through Sorong (the economic center of the Bird's Head) and to a lesser extent through Fakfak and Manokwari (the administrative center of the Bird's Head). All these centers are serviced by air and by boat. Access to the project area of influence is primarily through ferry transport from Sorong into Berau and Bintuni Bay, the most proximate ports of call being Bintuni and Babo. From Babo, transport can be arranged to travel to villages most proximate to the LNG site, namely Saengga and Tanah Merah Baru. The original Tanah Merah village had been relocated to Tanah Merah Baru to allow development of the LNG facility. During construction

FIGURE 5. DIAGRAMMATIC SKETCH MAP OF IN-MIGRATION PATHWAYS AND POTENTIAL HOTSPOTS, TANGGUH PROJECT, PAPUA, INDONESIA.



of the resettlement village, which occurred prior to the start of construction of the LNG facility, a large number of in-migrants came to Saengga to secure employment during construction and were thus well placed to take advantage of any employment opportunities associated with LNG construction. Small airports with limited use exist in Babo and Bintuni (although the Babo airport was subsequently upgraded by the project to accommodate larger aircraft). In-migration hotspots are identified as Saengga, Tanah Merah Baru, Babo and to a lesser extent Bintuni.

Example 2: The Rio Tinto Simandou Iron Ore Project, Guinea

The initial footprint of the Simandou Project are two project base camps the development of which has been associated with upgrades in transport infrastructure (roads, airports). The existence of the camps together with the improved infrastructure has led to the development of in-migration hotspots in villages closest to the camps, this being initially exacerbated by the existence of front-gate employment opportunities (although these have now been moved to Beyla). The proximity of the operations to neighbouring countries including Sierra Leone, Liberia and Cote D'Ivoire some of which have experienced civil war associated with displacement of the population suggests that cross-border in-migration may be a problem, with movement of displaced peoples or defeated groups into the area. With a broader and long-term view it is clear that the nearest town (Beyla) will be the locus of economic development and consequently bear the brunt of in-migration. In addition the transport facilities to be developed to transport the iron ore to port (an 710 km railway line) may well serve as a focal point for in-migration and settlement, both at the point of origin and at the destination.

FIGURE 6. DIAGRAMMATIC SKETCH MAP OF IN-MIGRATION PATHWAYS AND POTENTIAL HOTSPOTS, SIMANDOU, GUINEA

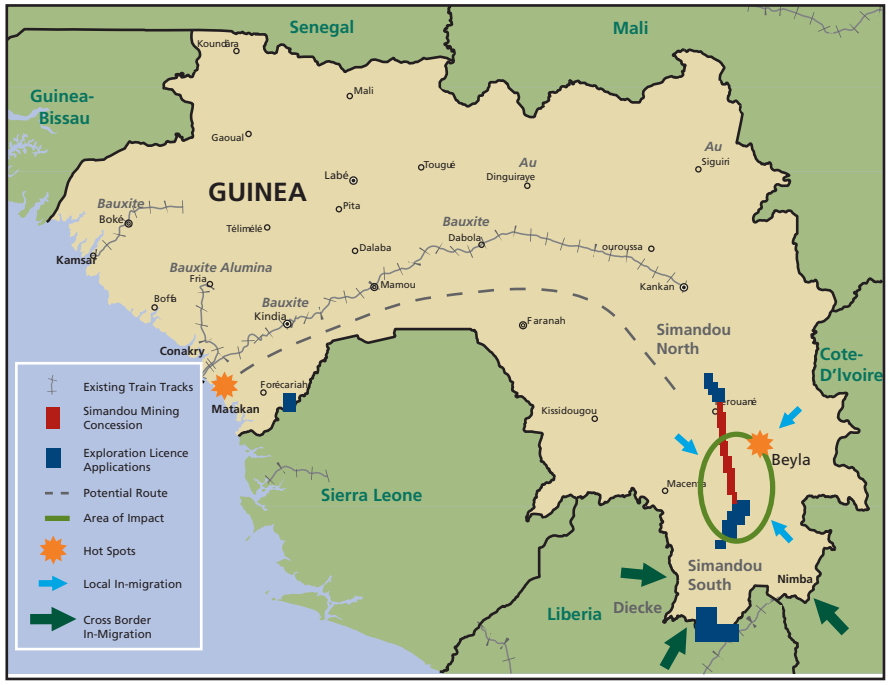


FIGURE 6B. ENLARGEMENT OF DIAGRAMMATIC SKETCH MAP OF IN-MIGRATION PATHWAYS AND POTENTIAL HOTSPOTS, SIMANDOU, GUINEA

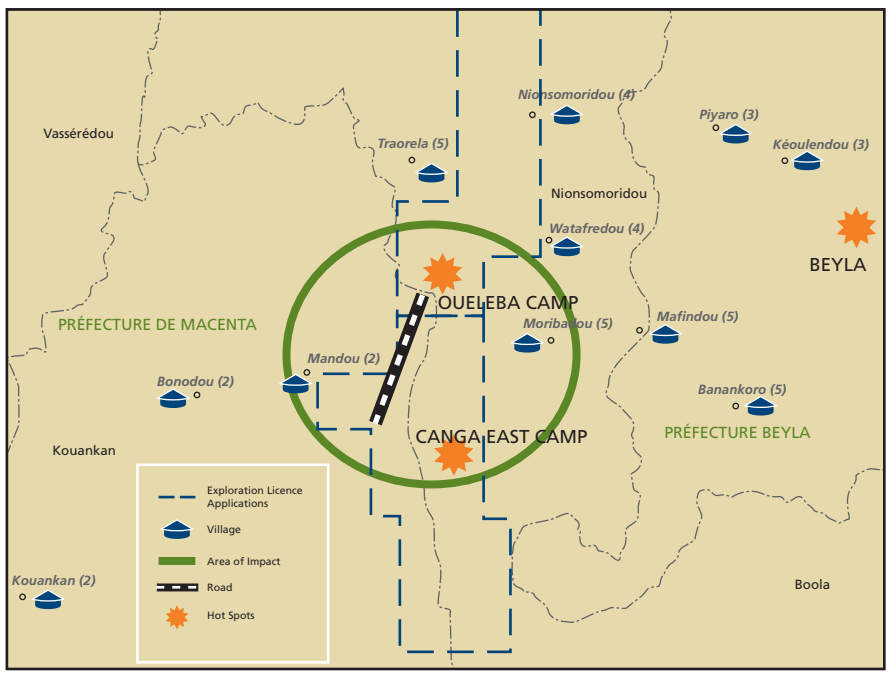
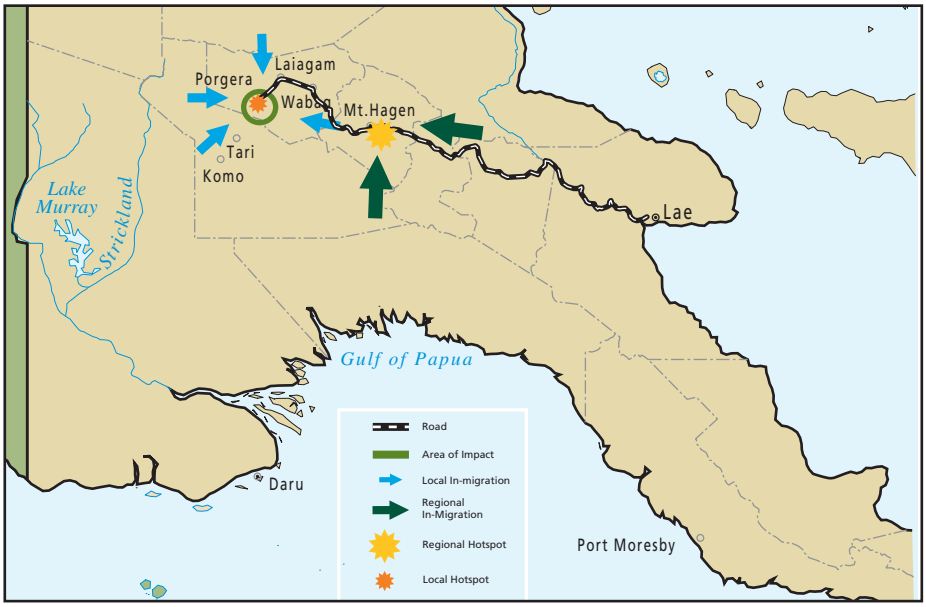


FIGURE 7. DIAGRAMMATIC SKETCH MAP OF IN-MIGRATION PATHWAYS AND POTENTIAL HOTSPOTS, PORGERA JOINT VENTURE (PJV)/BARRICK GOLD, PAPUA NEW GUINEA.



Example 3: The PJV, Barrick Gold, Porgera, Papua New Guinea

Prior to the development of the mine, Porgera was a remote highland out-station accessible by plane or on foot. Development of the PJV open-cut mine operations involved improvement of the highlands road connecting the port in Lae to Mt.Hagen and the development of a road from Mt. Hagen through Wabag (the administrative capital of the district) to Porgera. The road-head at Porgera is effectively also the location of PJV operations and the mine. In-migration can be predicted to occur through the highlands road through Mt. Hagen and on to Porgera, bringing lowland Papuans to the highlands in search of employment as well as tribal people living in the vicinity of Porgera (the Ipili, the Huli, the Enga and others) toward the mine and the town. Impacts associated with in-migration can be expected along the highway, in Mt Hagen, Wabag and Porgera.

ASSESSING THE POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS OF IN-MIGRATION

The most important component of the situation analysis is prediction of the type and probability of the key impacts associated with in-migration and the location, timing and likely severity of their occurrence. This exercise relies on a combination of information, including:

- Prediction of in-migration pathways and hotspots;
- Prediction of the rate and magnitude of in-migration; and
- Knowledge of local conditions.

The experiences of other projects in comparable circumstances also provide a useful guide to identifying the type and probability of impacts and their severity. Specific factors identified on page 59 should also be taken into account.

A systematic approach to this exercise involves the following three key steps:

1. Use the analysis of in-migration pathways and hotspots to identify where the in-migration phenomenon will be expressed. Subsequent analysis should be conducted separately for each hotspot.
2. Combine local and regional assessment. The type, probability, and severity of potential impacts should be analyzed at a local level at identified in-migration hotspots. Note that there is limited utility in aggregation for the purposes of analysis and design of an influx management plan.
3. Use a combination of predictions regarding the rate and magnitude of in-migration and knowledge of local, regional, and national conditions to identify the key impacts. A summary table of factors and potential impacts associated with project-induced in-migration is provided in Annex 4, with an extract provided in Table 10 below. The list of potential impacts should serve as a prompt, and only an aggregate analysis should be developed for each factor.

   The situation analysis should include a completed table for the project area of operations as a whole, and for each identified in-migration hotspot.

The first step in using the table would be to quickly assess whether the identified impact is potentially applicable to the project under consideration. Where the impact is deemed applicable, an informed prediction of the probability of the impact occurring, the timeframe in which the impact will develop and become tangible, and the likely severity of the impact is required. Information from the initial risk assessment and primary and secondary data should provide guidance to responding to these questions.

After completing the table, it may be useful to develop a likelihood-consequence matrix (Table 11). The matrix can then be populated with the identified impacts and the consequences of their occurrence.

TABLE 10: ANALYSIS OF PREDICTED ENVIRONMENTAL AND SOCIAL IMPACTS FROM PROJECT-INDUCED IN-MIGRATION

Category	Potential Impacts	Applicability	Probability/ Scale	Timeframe	Severity
		Y/N	L/M/H	S/M/L	L/M/H
ADVERSE IMPACTS					
Environmental	Comments:				
Logging					
Deforestation					
Exploitation and loss of biodiversity					
Land-use change					
Land degradation					
Depletion of natural resources					
Erosion and loss of soil productivity					
Air, water, and soil pollution					
Disruption of waterways					
Increased pressure on, and possible disputes over, land use and common property natural resources					

TABLE 11: SAMPLE LIKELIHOOD-CONSEQUENCE MATRIX

Likelihood Scale	Consequence Scale				
	Inconsequential	Limited	Overt	Significant	Extreme
1 Improbable	Low	Low	Medium	Medium	High
2 Unlikely	Low	Low	Medium	Medium	High
3 Possible	Low	Medium	High	High	High
4 Likely	Medium	Medium	High	High	Peak/ Very High
5 Almost certain	Medium	Medium	High	Peak/ Very High	Peak/ Very High

HEALTH RISK ASSESSMENT

In addition to assessing the risk of environmental and social impacts, the situation analysis should also evaluate the risks of health impacts in the area, for both the local population and the project workforce. The most commonly utilized tool for the analysis of health impacts, positive or negative, is the Health Impact Assessment (HIA).[2] While the scope of an HIA is generally broader than just in-migration related health impacts, experience indicates that in-migration is one of the key drivers of health impacts, and consequently must be carefully analyzed (refer to p. 16 of IFC's *Introduction to Health Impact Assessment*). The Environmental Health Areas (EHAs) framework is a standard method for analyzing project-triggered health impacts (see Annex 1).

STAKEHOLDER IDENTIFICATION AND ANALYSIS

Various stakeholders may be involved in the management of project-induced in-migration, including the project, local and regional government, nongovernmental organizations, community-based organizations, religious groupings, and the affected communities. The situation analysis should identify key stakeholders, assess their capacity and identify their potential roles in in-migration management.

CONCLUSION

The chapter has set out a basis for assessing the risk of project-induced in-migration. Where risks are identified as medium-high, it is recommended that the Project implement a situation analysis as a basis for developing an influx management strategy. Key aspects of a situation analysis, namely the identification of hotspots, the identification and assessment of potential environmental and social impacts, and the assessment of potential health risks were described. The situation analysis and the component analyses contained therein provide a more detailed and in-depth consideration of project-induced in-migration thereby complementing ESIA. Part 4 provides a description of possible management approaches. Subsequently, Part 5 considers how a project formulates a management strategy by combining the approaches and selected interventions.

2 The HIA is a structured multidisciplinary methodology that draws extensively on literature reviews, combines qualitative and quantitative data, and relies on extensive consultation with all stakeholders. For more information see International Finance Corporation (IFC), *Introduction to Health Impact Assessment*, April 2009.
http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_HealthImpactAssessment/$FILE/HealthImpact.pdf