Report:

Water, Mining and Communities Panel

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Executive Summary

This report presents an overview of the plenary Water, Mining and Communities Panel held during the 24th World Mining Congress (WMC) in Rio de Janeiro in October 2016. The panel comprised experts from around the world, and focussed on water stewardship. Based on the attention given to water at the WMC, it is clear that water is a matter of the highest priority for the global mining industry.

Water is a scarce vital resource that has become a contentious issue globally, given that 71% of the global population experiences water scarcity at least one month of the year, and half a billion people face severe water restrictions all the time. However, water is also a critical element for mining operations, with the consequence that the mining industry’s access to water is sometimes disputed by local communities. Increasingly limited access to water is becoming a major risk for the mining industry and thus is impacting investment decisions. While the industry has taken steps to become more water efficient, water quantity and quality continue to impose technical challenges in regions where new mines are discovered, as well as where established mines exist.

These technical difficulties are exacerbated by the growing opposition to mining projects, driven in part by the concerns of communities, governments, and other water users about water availability and quality. Concurrently, national and regional governments are facing challenges regarding how to promote economic and sustainable development, while managing water resources. In some jurisdictions, public-private partnerships are seen as opportunities to respond to some of these challenges. In others, participatory environmental monitoring groups have been established to deal with conflicts, address societal concerns, and enable multi-stakeholder participation. There is also a growing interest in catchment-based water stewardship, which is in part being driven by the International Council on Mining and Metals (ICMM).

The plenary Water, Mining and Communities Panel was facilitated by Dr. André Xavier (Canada). The panel participants were: Manuel Bernales (Peru), Tom Butler (United Kingdom), Ben Chalmers (Canada), Maria de Fátima Chagas (Brazil) and Bern Klein (Canada). Mr. Bernales focused on the role of local communities in environmental participatory monitoring committees in Peru, and the Integrated Governance Model developed by Futuro Sostenible. Ms. Chagas provided insights into integrated water use planning in mining regions in Brazil, including measures implemented in times of water scarcity. Dr. Klein discussed the importance of enhancing government capacity through education and applied research on integrated water resources management. He described the Integrated Water Resource Management Program (IWRM) that CIRDI is implementing in Peru, as well as the joint Diploma in Water and Mining. Mr. Chalmers presented an overview of water management aspects embedded in the Towards Sustainable Mining (TSM) framework, and also announced the recent creation of the Water Stewardship Framework.
Mr. Butler highlighted the risks that water conflicts pose for mining companies, and presented a practical approach used by the International Council on Mining and Metals (ICMM) to promote best practices in water stewardship.

After the panel discussions, time was allocated for all delegates to question the panellists. This session allowed for valuable exchanges of knowledge and insights, which are shared in this report.

Water usage regulations are becoming more stringent worldwide. In response to these challenges, the mining industry is continuously searching for ways to achieve a more efficient use of water. It is expected that problems related to water management will increase and that the mining sector will need to be effective, proactive, and transparent in relation to water management. In particular, the Panel highlighted the need for mining companies to facilitate the meaningful involvement of local communities, and to adopt an integrated watershed or catchment approach that brings to the table government, the industry, and communities.
1: Introduction

This report presents a summary of the discussions at the Water, Mining and Community Panel that took place on October 20th 2016 during the World Mining Congress in Rio de Janeiro. This introduction will place these discussions in a global context.

The global population is approximately 7.3 billion, and by 2030 this number will reach 8.5 billion. Worldwide, 780 million people do not have access to clean water, and about 842,000 people die each year from waterborne diseases as a result of unsafe drinking water, insufficient sanitation, and poor hygiene. According to Mekonnen and Hoekstra (2016), 71% of the global population experiences water scarcity at least one month of the year, and half a billion people face severe water restrictions all year around. In recent years, with population growth and migration to cities, the pressure on water resources has become a global concern that needs to be addressed.

Our current water crisis is considered the greatest global risk to humanity, creating tension among its varied users. Water is essential for drinking, livestock, and crops, as well as for industrial activities, such as mining. Globally, regulations governing the use of fresh, potable water are becoming more stringent. The impact of poor water management is destructive for the mining industry, as water is crucial for all stages of a project (International Finance Corporation, 2014).

Very often, mining projects take place in areas where river basins are shared with communities and other industrial and agricultural users, resulting in environmental, social, and economic challenges.

With the increasing demand for water, the implementation of a sustainable management approach is vital to address water concerns. Water management is necessary to control the availability and quality of water resources. Increasingly limited access to water is becoming a major risk for the mining industry and thus is impacting investment decisions (International Finance Corporation, 2014). The total water intake of a mining operation varies depending on the size of the mine, the mineral being extracted, and the extraction processes used (Guson et al., 2010). According to Statistics Canada, in 2009 the total water intake by the mining industry accounted for 497.2 million m$^3$ and the volume of water discharged was 620.4 million m$^3$. Approximately 77.2% of the water withdrawn by the mining industry was self-supplied surface freshwater. Furthermore, in regards to recirculation, the primary metals industry reports a recirculation rate of 86.5% (Statistics Canada, 2009).

In Peru, for example, the mining sector consumes 1.46% of all water used (ANA, 2012), but 68% of mining-related complaints related to water issues and poor management. Moreover, 85.48% of the water is consumed for agricultural applications. As reported by Morgan Stanley (2012), mining uses 5% of water globally. Despite this, mining is perceived as the industrial sector that has the most negative impact on water availability and quality.
Conflict associated with the extractive sector is increasing worldwide, and many of the community-company conflicts are related to environmental concerns. The majority of the conflicts are related to water quality, quantity, and availability (Mekonnen and Hoekstra, 2016). Water is a critical input for the extractive industries, because it supports traditional livelihoods, through agriculture or fishing. The impacts of the extractive industry on water resources are often severe, especially in regions where water is scarce; and these impacts extend to local culture and social organization. It has been estimated that such conflicts cost the mining industry about 20 million dollars per week (Davis and Franks, 2011).

2: The Congress

The World Mining Congress (WMC) is an international mining event that takes place every three years. Led by a secretariat with organizational status, the WMC is associated with the United Nations and is located in the Central Mining Institute, in the city of Katowice, Poland. The event aims to promote and support, both technically and scientifically, cooperation for the national and international development of mineral areas and resources. This aim includes implementing a global information network concerning mineral science, technology, and the economy; and reviewing occupational health and safety and environmental protection standards.

The 24th World Mining Congress was held in Brazil in the city of Rio de Janeiro from October 18th to 21st, 2016. With an emphasis on the management of mining-sector business, the WMC brought together approximately one thousand academics, professionals, and government representatives from forty countries.

This report details the activities and achievements of the Water, Mining and Communities Panel that took place at this conference.

2.1: Objective of the Water, Mining and Communities Panel

The objective of the international Water, Mining and Communities Panel was to discuss leading practices, challenges, and opportunities related to integrated water resources management and the ways in which the mining sector could reduce conflict and contribute to the transition to a more sustainable approach to water management. The panel included representatives from several international organizations. Representatives from the International Council on Mining and Metals (ICMM) drafted a practical guide to catchment-based water management for the mining and metals industry. Representatives from the Mining Association of Canada (MAC) created an initiative called Towards Sustainable Mining (TSM).

The panel participants shared experiences, including approaches used by the mining industry, governments, and communities to meet the challenges of water management.
2.2 Panel Participants

The Water, Mining and Communities Panel was held in the Vale Auditorium on October 20\textsuperscript{th}, 2016, from 10:45 a.m. to 12:30 p.m. The panel discussion was facilitated by Dr. André Xavier from the Canadian International Resources and Development Institute (CIRDI) and the University of British Columbia (UBC). The panel participants were:

- **Manuel Bernales** – Project Manager, Futuro Sostenible, a Peruvian NGO that works with communities in mining regions, Peru
- **Tom Butler** – President and CEO, International Council on Mining and Metals (ICMM), United Kingdom
- **Ben Chalmers** – Vice President, Sustainable Development, Mining Association of Canada (MAC), Canada
- **Maria de Fátima Chagas** – Director General, Water Management Institute of Minas Gerais (IGAM), Brazil
- **Bern Klein** – Professor, University of British Columbia and Project Lead at the Canadian International Resources and Development Institute (CIRDI), Canada

![Figure 1: Vale Auditorium: Water, Mining and Communities Plenary Session](image)

1 The participants’ biographies may be found in the appendix at the end of this report.
2.3: Structure and Format

The Water, Mining and Communities Panel was structured as follows:

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Duration</th>
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<tbody>
<tr>
<td>Panel participants meet at Vale Auditorium</td>
<td>10:35 a.m. – 10:45 a.m.</td>
<td>10 min</td>
</tr>
<tr>
<td>Opening remarks by the panel moderator</td>
<td>10:45 a.m. – 10:50 a.m.</td>
<td>5 min</td>
</tr>
<tr>
<td>Moderator introduces panel participants</td>
<td>10:50 a.m. – 10:55 a.m.</td>
<td>5 min</td>
</tr>
<tr>
<td>Up to 10 minutes for initial remarks from each participant</td>
<td>10:55 am – 11:35 pm</td>
<td>40 min</td>
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<tr>
<td>Each participant will receive one question to help guide his/her initial remarks</td>
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</tr>
<tr>
<td>Questions from the audience and moderator</td>
<td>11:35 a.m. – 12:05 p.m.</td>
<td>30 min</td>
</tr>
<tr>
<td>Up to 3 minutes for final remarks from each participant</td>
<td>12:05 p.m. – 12:20 p.m.</td>
<td>15 min</td>
</tr>
<tr>
<td>Final remarks from moderator</td>
<td>12:20 p.m. – 12:30 p.m.</td>
<td>10 min</td>
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3: Water, Mining and Communities Panel

The panel commenced with each participant delivering a ten-minute presentation. The subjects covered various dimensions of water resources management. Mr. Manuel Bernales, Director of Futuro Sostenible, an NGO representative, reflected on the role of local communities through environmental participatory monitoring committees and discussed the specific reality in Peru. Ms. Maria de Fátima Chagas, Director-General of the Water Management Institute of Minas Gerais (IGAM), Brazil, provided insights into integrated water use planning in mining regions in Brazil. Dr. Bern Klein from the University of British Columbia in Canada discussed the importance of enhancing government capacity through education and applied research on integrated water resources management.

Mr. Ben Chalmers from the Mining Association of Canada presented an overview of water management aspects embedded in the Towards Sustainable Mining (TSM) framework that was developed by the Mining Association of Canada. Finally, Mr. Tom Butler from the International Council on Mining and Metals (ICMM) in the UK presented a practical approach used by the International Council on Mining and Metals (ICMM) for best practices in water stewardship.

3.1: Presentation 1: Introduction and Welcome

Dr. André Xavier (Program Manager, CIRDI)

Dr. Xavier initiated the panel by introducing the participants. He summarized some important facts about the use and consumption of water, and the difficulties that governments are facing in promoting economic
and sustainable development practices, and managing water resources with due regard to the interests and needs of different users. Dr. Xavier also highlighted how national and international organizations participating in the panel are working on initiatives to mitigate water scarcity and the risks associated with mining operations and regulations.

3.2: Presentation 2: Environmental Monitoring Community Committees

Manuel Bernales (Project Director, Futuro Sostenible)

Mr. Bernales reflected on the importance of participatory environmental monitoring committees as a mechanism to promote local level participation and to address local community concerns. In the context of Peru, participatory environmental monitoring committees have existed for at least ten years. Ideally they are made up of community members, mining companies, and government representatives that jointly collect water samples near mining operations, send them to certified laboratories for analysis, and report the results to the general public. A joint monitoring process, when supported by the government, can be seen as a public policy mechanism that helps to build trust between stakeholders. Furthermore, participatory environmental monitoring committees are valuable because they contribute to generating empowerment at the local level, as community members become more aware of their natural resources.

There are several participatory monitoring committees in Peru. To ensure that processes and standards are in place, the NGO Futuro Sostenible has developed an Integrated Governance Model that contributes to the success of these committees.

The Integrated Governance Model is based on three pillars:

![Figure 2: The Integrated Governance Model developed by Futuro Sostenible]
1. **Governance and Institutional Strength**: The committee members are legitimized by the community and democratically elected. Processes and tools are in place to maintain the transparency of the committee’s activities.

2. **Environmental Surveillance and Monitoring**: Committees are established to look at specific environmental concerns, which in most cases are related to water and community anxiety about the potential for mining operations to have a negative impact on water quantity, availability, and quality in the region around the mine.

3. **Technical and Interpersonal Skills**: Technical ability relates to the development of fundamental knowledge in environmental science, as well as techniques, procedures, and protocols for monitoring. It also relates to an understanding of current environmental regulations and policies. Under this pillar, interpersonal skills such as leadership and good communication are also developed.

   Successful committees evolve their scope over time, and in addition to monitoring water, they begin to have a more comprehensive approach to water management that will, for instance, cause them to look at integrated water resources management rather than just the quality of water in a stream or a river.

   An interesting example is the Rio Tinto La Granja Project that is in the exploration phase. The company decided to support the creation of participatory environmental monitoring committees as a way to respond to communities’ concerns about potential impacts of mining on water bodies in the region. Peruvian legislation does not require participatory committees in the exploration phase, but does require them in the production phase.

   Three communities next to the project area decided to participate in the water monitoring committee. During the first phase of training, community members began to focus on surveillance of the exploration activities to monitor possible environmental impacts.

   Over time, a positive relationship based on trust is built between the committees and local communities. As the committees mature, their members develop technical skills and the confidence to begin to broaden their focus to other environmental issues, such as domestic waste. They may even start environmental projects, such as composting or orchard planting. The committees also play an important role in communicating environmental matters to the larger community, which is done in an appropriate manner that can be understood by community members. The process of building trust requires time, persistence, and strong commitment at the corporate level.

   At the community level one of the challenges is to strengthen the internal dialogue process and to make sure that women, youth, and men are all involved in these committees.

   Futuro Sostenible’s experiences provide some valuable lessons and insights:
• The need for the establishment of a committee typically starts with the concerns of the local communities.

• Mining companies that have incorporated participatory monitoring committees as part of their local engagement strategy have reported fewer environmental concerns from the local communities.

• Continuous technical and interpersonal skills development is key to expanding a committee’s governance capacity and improving the ability to participate in dialogue with local government, mining companies, and their own communities.

• Participatory environmental monitoring committees are a tool to promote dialogue, build trust between a company and a community, and support the goal of achieving sustainable development at the local level.

Futuro Sostenible is currently working on developing an accreditation program for participatory environmental monitoring committees, and sees CIRDI as a key partner in supporting such an initiative. The certification process requires partners that are considered neutral and, for the most part, universities are respected by local populations.

In closing, Mr. Bernales mentioned that CIRDI, Futuro Sostenible, UNDP Peru, and the Dialogue Group in Mining and Sustainable Development were organizing the 3rd National Conference of Participatory Environmental Monitoring Committees in Peru, which would take place in Lima in October, 2016. He noted that the conference would bring together representatives from over twenty committees from around Peru to share their experiences with each other, as well as with mining companies and national and regional governments.

3.3: Presentation 3: Integrated Water Use Planning

Maria de Fátima Chagas (Director-General, IGAM)

The Minas Gerais Water Management Institute (IGAM), falls under the State Environment and Water Resources System (Sisema), located in Minas Gerais, Brazil. The Institute undertakes to:

• Regulate, control and monitor water resources.

• Provide technical support for the creation, implementation, and operation of watershed committees and agencies.

• Grant water right permits at the State level (also on a Federal level, when authorized).

• Collect, distribute and invest revenues from water use charges.

• Deploy and operate the hydro-meteorological and sediment metric networks that monitor the quality of surface and groundwater.
• Promote actions to prevent, or minimize the effects of, critical hydrological events.
• Prepare and update the register of water users and water infrastructure.
• Post weather forecasts.

The table and graph below (Figure 3) show the demand for water in the State of Minas Gerais, where mining consumes less than 10% of the water. On the other hand, agriculture and human consumption are responsible for 58.3% and 21.5% respectively. About 64% of the water sources for mining activities in the State originate from groundwater and 36% from superficial water.

![Table and Graph]

**Figure 3: Water Demand in Minas Gerais (Data based on Current Grants ordinances, 2016)**

Ms. Chagas explained that a multidisciplinary working group was created to elaborate on the terms of reference for the application of a normative resolution on Integrated Water Use Planning in mining (State Council 37/2001). The Water Use Plan is intended to allow the government to issue water permits once they have a comprehensive and integrated understanding of proposed water usage in a mining operation. The plan must include:

• water usage: consumptive and non-consumptive;
• the structures for water abstraction and discharge of effluents with their respective volumes of capture or dilution;
• use purposes and water management;
• the water balance and its variations over time;
• changes in water availability generated by the enterprise in the area of its direct influence;
• monitoring plans for water quantity and water quality and;
• mitigation measures of possible hydrological impacts and specificities related to water level lowering systems.
Ms. Chagas also mentioned that due to the 2015 drought in Minas Gerais, IGAM needed to intervene and reassess the water permits of all users, including the mining sector. This intervention was supported by the Normative Resolution Water Resources State Council 49/2015 that established guidelines for the restriction of surface water resources. During a water shortage, IGAM temporarily curbs the use of water. In general, there has been a reduction in water consumption: industrial and agro-industrial sectors have enforced a reduction of 30% of the water licenses granted; human consumption has decreased by 20%; animal watering or public water use by 25%; and other purposes by 50%.

Another important management tool used in the State of Minas Gerais is Collective Granting. When the demand from established or intended uses is higher than the grantable flow from a watershed, strict water limits are set.

In this case, when someone requests a new water permit or the renewal of an existing permit, the regulation establishes the watershed as a conflict zone. (Conflict in this context according to the Minas Gerais water regulation does not imply social conflict.) In order to respond to the needs of current and prospective users, the regulation requires that the interested parties establish an association or working group to apply for a single grant process. This process regulates the water use of users who are in the conflict areas. This allocation requires the following minimum objectives: to meet environmental, economic, and social needs; to reduce or eliminate conflicts among users; and to enable planning so that future demands are met.

Another important role of IGAM relates to setting up and managing water resources councils and watershed committees. Stakeholders then have space to discuss and manage water resources in specific regions and watersheds. For example:

- The Water Resources Council, the central deliberative and normative entity of the State System of Water Resources Management, is composed of representatives from the government, water users, and civil society organizations linked to water resources.
- The Watershed Committees are deliberative, normative, and collegiate entities that represent the participatory and decentralized management of water resources in Brazil. The government, water users, and civil society can discuss, negotiate, and debate issues related to water resources in the watershed. In addition, they can arbitrate conflicts related to water resources in the watershed, and approve master plans for the watershed.

3.4: Presentation 4: Peru Integrated Water Resource Management Program

Dr. Bern Klein (Project Lead, CIRDI)

Dr. Klein’s presentation focused on the Integrated Water Resource Management Program (IWRM) that CIRDI is implementing in Peru. CIRDI is a center of expertise for improving and strengthening resource
governance, and is a coalition of the University of British Columbia, Simon Fraser University, and École Polytechnique de Montréal, working in partnership with the Canadian Government, civil society, and industry.

For the past ten to fifteen years, Peru’s economy has been significantly influenced by its mining sector, which produces 21% of the GDP and 50% of the country’s exports (FocusEconomics, 2015). Mining has enabled the country’s economy to grow steadily. Concomitantly, concerns about the preservation of the environment has grown, and in some cases has led to direct conflicts that have involved the government, domestic, and international mining companies, and local communities. Many of the environmental concerns brought forward by the communities relate to water. Many mining projects are located in the arid Andean region where water is scarce, making water the primary focus of conflict.

The IWRM Program that CIRDI is implementing aims to support and improve water stewardship and activities that address water-related mining issues. The primary objective of the IWRM program is education and research to strengthen the foundation for informed dialogue, conflict prevention and resolution, and water governance. The program aims to improve water stewardship, with a focus on community needs and opportunities.

Communities become anxious when mining companies come to their regions; there is a general perception that mines will take all the water and contaminate the natural environment. At the same time, issues related to climate change in the Andean region add more complexity to the situation. All of these factors compel the mining industry to become more efficient and learn to address these issues so that it can create a peaceful and stable environment to develop its operations.

Dr. Klein indicated that most challenges facing the mining sector today are community related. Local community members need to be able to understand the nuances of a mining operation, and voice their opinions. Ideally, community members should be able to participate in development decisions within their regions and specifically in decisions related to water resources management and governance.

For effective participation and decision making, continuous education and applied research are of fundamental importance. It is in this context that the CRIDI-IWRM program, in collaboration with the universities UNASAM in Huaraz, and UNSAAC in Cusco, is focusing on two Peruvian regions where mining activities are taking place. The goals are to work in partnership with those universities to develop specialized education programs, get local faculty and students involved in related studies that address the local issues, and provide research results that inform the government and other interested parties so that they can constructively address the issues. Creating this type of education foundation allows for ongoing learning and change.

One example of an education initiative that CIRDI and the University of British Columbia (UBC) are involved in is through their partnership with the Pontificia Universidad Católica del Peru (PUCP).
Through the PUCP Masters of Water Resource Management program, UBC and PUCP have approved a one-year joint Diploma in Water and Mining.

For this joint diploma, the UBC Certificate in Mining Studies program contributes three technical courses: Integrated Water Resource Management, Groundwater Hydrology, and Mine Water Management, while PUCP contributes five other courses.

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<td>Ciclo 2</td>
<td>Integrated Watershed Management /Gestión Integrada de Cuencas Hidrográficas</td>
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<td>Ciclo 2</td>
<td>Water and Mining/Agua y Minería</td>
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<td>Ciclo 2</td>
<td>Water Law/Legislación y Derechos del Agua</td>
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<td>Ciclo 2</td>
<td>Principles and methodologies for the regulation of water resources/ Regulación de los recursos hídricos.</td>
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<td>Ciclo 2</td>
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<td>Ciclo 2</td>
<td>Elaboración de Proyecto</td>
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<tr>
<td>Ciclo 2</td>
<td>Elective course/Curso electivo</td>
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**Figure 4: Joint Diploma in Water and Mining Courses**

Upon completion of these eight courses, students earn a certificate from UBC as well as a diploma from PUCP. Furthermore, these courses can be credited towards the Master of Water Resources Management degree offered by PUCP. The program is scheduled to begin in March 2017.

Dr. Klein also stressed the important roles of communities, representatives from all levels of government, NGOs, and representatives from mining and other regions. Contrary to some beliefs, local development and industrial activity are not mutually exclusive. The potential benefits gained through effective collaboration can be substantial, as exemplified by the achievements of the Peruvian government, the municipal government in Arequipa, and the Cerro Verde Mine that has led to the creation of water reservoirs, a chlorination plant that provides clean drinking water to the city, a sewage collection system, and a sewage treatment facility. The partnership led to the clean up of the Chile River, with positive impacts on the environment and community health, as well as on downstream agricultural communities.
The main partners for the program in Peru are the National Water Authority (*Autoridad Nacional del Agua* – ANA) and PUCP. ANA provides guidance about program content, and at the same time sends their employees to these education programs. They also advise on and participate in the applied research. PUCP provides specialized courses on water governance and partners with UBC to deliver the Diploma in Water and Mining, as mentioned above.

The objective of the program is to focus on education and applied research at three levels: the national government, the municipal, and the local community level.

### 3.5: Presentation 5: The Mining Association of Canada TSM program

**Ben Chalmers (Vice President, Mining Association of Canada)**

The Mining Association of Canada’s Towards Sustainable Mining (TSM) program incorporates a set of tools and indicators to drive performance and ensure that key mining sustainability risks are managed responsibly by mining operators. By adhering to the principles of TSM, members demonstrate leadership by:

- creating opportunity for meaningful engagement with communities;
- driving world-leading environmental practices; and
- committing to the safety and health of employees and surrounding communities.
The TSM program is guided by the Community of Interest Advisory Body, and is customized based on each community’s needs. Each implementing jurisdiction is required to have the seven TSM components in place: Guiding Principles; Performance Indicators; Facility Level Reporting; Independent Verification; Public Reporting of Facility Level Reporting; Condition of Membership; and Community of Interest Advisory Body. TSM is currently being implemented by national mining associations in Canada, Finland, Argentina, and Botswana.

In Canada, the Community of Interest Advisory Body includes different groups of people including aboriginals, environmental NGOs, economic/community development groups, and social NGOs, including faith-based groups, finance/investment groups, international development organizations, members from MAC board of directors, and junior mining company representatives. The group meets twice a year, and their annual Community of Interest panel statement program is published in the TSM progress report. In Canada, TSM is currently focusing on three areas:

- **Environmental Stewardship:** Tailings Management and Biodiversity Conservation Management
- **Communities and People:** Aboriginal and Community Outreach, Safety and Health Management, and Crisis Management
- **Energy Efficiency:** Energy Use and Greenhouse Gas Emissions Management

The Mining Association of Canada has always recognized that water is essential in all mining and mineral processes, and that water is a finite resource with high social, cultural, and environmental value. To this end, MAC has recently created the Water Stewardship Framework which includes: management of surface and ground water resources; engagement with communities to understand water needs and uses and manage potential impacts; and management of water in a transparent and accountable matter. A water protocol with measurable indicators will be developed in 2017.

### 3.6: Presentation 6: Water – a Critical Constraint to the Development of Mineral Resources

**Tom Butler (CEO, International Council on Mining and Metals)**

Water is one of the most significant issues facing the mining and metals industry and can be a constraint on the development of mineral resources. In many cases, companies in the mining sector are ignoring the risks to their valuations and predications of future revenue. Water use is an important issue that must be addressed by those companies. To illustrate this, a Kinross Gold Corp. operation in Chile was suspended and workers were laid off after a water shutdown. The result was massive losses for the company and the workers. Water connects an operation with the surrounding landscape and community and often creates conflict with mining companies and with the local businesses.
It is vital for mining companies to manage their water (both quantity and quality) inputs, use, and outputs to maximize resource sustainability, operational flexibility, and economic benefits. Most importantly, companies must understand the social, cultural, economic, and environmental value of water at the catchment scale to identify water stewardship risks and provide context for corporate and operational water management. The International Council on Mining and Metals (ICMM) has identified a number of challenges related to water management faced by mining operators. These challenges include:

- poor performance of local institutions, including government agencies and regulators;
- lack of sound science to support effective water resources management;
- lack of senior buy-in and support and;
- lack of communication of complex operational water use with communities.

Measuring, monitoring, and addressing these issues is necessary to develop a partnership with the governments and local institutions to build a water management strategy focusing on sustainable mining practices and engagement with local communities.

ICMM’s water stewardship framework outlines a standard industry approach to assist in addressing these challenges. It was designed to incorporate four key strategies:

1. To be transparent and accountable.
2. To engage proactively and exclusively with stakeholders, focusing on understanding priorities, sharing plans, and collaborating on solutions.
3. To adopt a catchment-based approach.
4. To have effective water resources management.

The following are some of the solutions proposed by the ICMM:

- Develop partnerships to build capacity and strengthen local institutions.
- Share industry data with government.
- Form cross-functional teams to address multiple aspects of water risk.
- Build water management strategies into business capital and the mine planning process.
- Find meaningful and culturally appropriate ways to engage with local communities.

The catchment-based approach comprises a corporate water standard of local implementation, including engagement with the communities and partnerships with local and international organizations.
4: The Interactive Plenary Session

During the 30-minute discussion section, the speakers were able to answer questions from the moderator and the audience.

In responding to a question regarding the role of IGAM during and after the tragic Samarco tailings dam failure, Ms. Chagas mentioned that IGAM was collecting samples in twelve distinct locations along the Doce River. She also highlighted the fact that IGAM has been collecting samples and monitoring several points along the Doce River for over fifteen years, and that this historical data was crucial to attaining a technical understanding of the impacts of the failure.

Mr. Chalmers mentioned that the Finish mining sector had adopted the MAC TSM framework and have thereby created a water protocol. Mr. Chalmers also explained that under the TSM framework, MAC members engage collaboratively with communities of interest to understand water needs and uses, and to manage potential impacts of their facilities on water resources by working with communities to mitigate shared risks and impacts.

Mr. Bernales stressed that residents near mining operations want to be consulted and engaged in the process and that participatory monitoring committees in Peru are a mechanism to facilitate that participation. He underscored the importance of ongoing training and support for these committees.

Dr. Klein pointed out that national and regional universities have an important role to play in integrated water resources management; and that this role could include education as well as applied research that is directly relevant to the region.

Mr. Butler and Mr. Chalmers highlighted the importance of mining operators engaging people at the local level to understand community concerns and priorities, including a strong catchment-based approach, regarding water risk management. They also mentioned that participatory monitoring committees are vital to facilitate community engagement and participation. Mr. Butler also pointed out the necessity of transparency of governance for the benefit of countries and communities in the development of natural resources. He highlighted the importance and benefits for ICMM members of the use of the practical guidance systematic approach in response to catchment-based water risks. This helped them to understand the different issues related to water management and lessons learned.

5: Conclusions

This report has presented an overview of the Plenary Water, Mining and Communities Panel that focussed on water stewardship, and was held during the 24th World Mining Congress (WMC) in October 2016. Concepts and strategies adopted by international organizations were debated during this conference. The
WMC held two other plenaries for which water was a central theme, including a plenary on tailings management with consideration of dam failures, climate change, and the sustainable development goals. Based on the attention given to water at the WMC, it is clear that water is a matter of the highest priority for the global mining industry.

Experts from organizations from Brazil, Canada, and Peru participated in this plenary session. A member of ICMM (based in the UK) also participated, representing the mining sector worldwide.

Population growth and climate change are among the reasons for the decreasing availability of water. As a consequence, regulations about water usage are becoming more stringent worldwide. In response to these challenges, the mining industry is continuously searching for ways to achieve a more efficient use of water. It is expected that problems related to water management will increase and that water users, including the mining sector, will need to be effective, proactive, and transparent in relation to water management. Local communities want to be involved in a meaningful way in the preservation of their environment and are asking for more participatory spaces and mechanisms. Adopting an integrated watershed or catchment approach that brings to the table government, the industry, and communities is essential to foster dialogue around priorities, concerns, and needs.

6: Acknowledgments

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Also, on behalf of IBRAM and the World Mining Congress, we would like to thank the panel participants for their time and contributions to the event.

7: References


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8: Other Resources

CIRDI (Canadian International Resources and Development Institute): http://cirdi.ca/
Futuro Sostenible: http://www.futurosostenible.org/
IGAM (Instituto Mineiro de Gestão das Águas): http://www.igam.mg.gov.br/
The Mining Association of Canada: http://mining.ca/towards-sustainable-mining
The University of British Columbia: http://mining.ubc.ca/
9: Appendix: Biographies of the Moderator and the Panellists

9.1: Panel Moderator

Dr. Andrée Xavier, Canadian International Resources and Development Institute (CIRDI), Canada

Dr. Xavier holds a BSc and an MBA, and a PhD in Mining Engineering from the University of British Columbia, Canada. His research topics have involved investigating corporate social responsibility initiatives implemented by small and medium sized companies and their impacts on local communities. His PhD research has focused on the socio-economic aspects of mining closure, local economic development, and diversification. Dr. Xavier works for the Canadian International Resource and Development Institute (CIRDI) and is the program manager for the Education and Research for Integrated Water Resources Management project in Peru that contributes to a cohesive and integrated management of Peru’s water resources in regions where mining activities occur. His responsibilities include working with governments, the mining industry, NGOs, universities and local partners. Dr. Xavier is an honorary professor at the Norman B. Keevil Institute of Mining Engineering, University of British Columbia, Canada.

9.2: Panellists

Manuel Bernales Pacheco, Director, Futuro Sostenible

Mr. Bernales is a Project Manager at Futuro Sostenible. He is a Social Psychology PhD candidate at the University of Salamanca in Spain. He is a former professor at the Pontificia Universidad Católica, Universidad Peruana de Ciências Aplicadas (UPC), Antônio Ruiz de Montoya University and Universidad Pacífico. Mr. Bernales has extensive experience in environmental conflict resolution processes in the
mining and oil industries. He has led all the projects for Community-based Environmental Monitoring Committees at Futuro Sostenible. He has supported the Ministry of Environment, Ministry of Energy and Mines and SENACE (where he was in charge of approving EIA’s on environmental information systems, evaluation and certification issues). Futuro Sostenible is a non-profit organization that also functions as a consultancy firm in the region. It conducts studies and analyses related to conservation and environmental management, and sustainable management of renewable and non-renewable natural resources. Futuro Sostenible offers training and facilitation of technical and social processes aimed at strengthening environmental governance and sustainable development. In addition, since 2004 Futuro Sostenible has collaborated with Peruvian professionals, and partnered with institutions across the Americas. Futuro Sostenible also works with the Confluence Group, which is made up of experts, researchers, and Latin American institutions seeking the transformation of socio-environmental conflicts with justice, equity, and environmental sustainability in Latin America.

Tom Butler, President and CEO, International Council on Mining and Metals (ICMM), UK

Mr. Butler became President and CEO of ICMM in July 2015. Before joining ICMM, he spent 18 years with the International Finance Corporation (part of the World Bank Group) in mining and power projects in Africa. From 2011, Mr. Butler was Global Head of Mining, where he led a multi-disciplinary team of specialists responsible for IFC’s financing of mining exploration and development in emerging markets, all to IFC’s environmental and social Performance Standards. Mr. Butler began his career as an officer in the British army. Before joining IFC, he was a project manager and engineer with oil and gas industry service companies Technip and Schlumberger. He holds an engineering degree from Cambridge University in the UK, and an MBA from INSEAD in France.
Ben Chalmers, Vice President, Sustainable Development, Mining Association of Canada, Canada

Mr. Chalmers is the Vice President of Sustainable Development at the Mining Association of Canada (MAC). He has been working in the mining industry since 2004, and has been involved in environmental management, community engagement, project management, and human rights. Mr. Chalmers holds a MSc in Environmental Management from Royal Roads University and a BSc in Geography from Simon Fraser University. In his role at MAC, Mr. Chalmers is responsible for the implementation of Towards Sustainable Mining (TSM). He was involved in a review of Tailings Management, a component of the TSM, and conducted the inspection and review following the 2014 tailings dam failure at the Mount Polley Mine.

Maria de Fátima Chagas, Director-General, Water Management Institute of Minas Gerais, Brazil

Ms. Chagas has a Bachelor of Civil Engineering (BEng) from the Federal University of Minas Gerais and completed graduate studies in Hydraulics at the Federal University of Ouro Preto in Brazil. She has extensive experience in hydrology, environmental management, planning and management of water resources, and has acted at both technical and coordination levels in studies and projects in these areas. In March 2015, she became the Managing Director of the Minas Gerais Water Management Institute of Minas Gerais, an institution which is part of the State Environment and Water Resources System. Prior to that, she held the following positions: Director of the National Secretariat of Water Resources of the Ministry of Environment in 2003; Deputy Secretary of Environment and Sustainable Development of Minas Gerais in 2002; Manager of the National Water Agency; General Coordinator of the National Development Program of Water Resources “Pro-água Semi-Arid” in Minas Gerais; and
Researcher and coordinator of the Water Resources Department of the Technological Center Foundation of Minas Gerais. Ms. Chagas has written for several publications in hydrology and water resources.

**Dr. Bern Klein, Professor at the University of British Columbia, Canada**

Dr. Bern is a Professional Engineer with a PhD in Mineral Processing. He is a Professor of Mineral Process Engineering at the University of British Columbia, where he served as Head of the Norman B. Keevil Institute of Mining Engineering from 2008 to 2014. During his term as Head, he was pivotal in the creation of the Canadian International Resources and Development Institute (CIRDI), which is a coalition of three universities: the University of British Columbia, Simon Fraser University, and École Polytechnique de Montréal. This partnership supports improved governance of extractive sectors in developing countries in order to reduce poverty. He served as Acting Executive Director of the Institute during its start-up and is now a Project Lead for a program in Peru focused on water stewardship. In addition, he acts as a technical advisor to a program in Mongolia where he contributes to water resources management.

Dr. Klein has over 25 years of experience managing research and industry related projects for the mining industry. His main area of research relates to energy efficiency and water quality. He has been an active member of the Canadian Institute of Mining (CIM) and has organized and chaired a range of mining related conferences.