



Type what you want to search

Search



05/18/2015



Vale Institute of Technology encourages research in Brazil

With two sites in operation, the ITV is the first technological centre in the mining sector to offer postgraduation courses

In 2009, Vale founded the Vale Institute of Technology (ITV), with the aim of seeking medium and long-term innovative solutions that contribute to improving the operational performance of every stage of the company's business, from the mine to the final delivery of our product to our clients. The intention is also to help to generate fundamental changes in the structure of Vale's business in relation to the environment and communities. The ITV currently maintains two sites: one in Belém, in the Brazilian state of Pará, specialized in sustainable development, and the other in Ouro Preto, in the state of Minas Gerais, focused on themes related to mining.

To achieve these objectives, the ITV operates by integrating three pillars: research, teaching and entrepreneurship. For the first, the idea is to promote fundamental scientific and technological knowledge in the areas of mining and sustainable development. For the second, the institute aims to train professionals that are capable of confronting the challenges

facing global mining in the 21st century in a scenario of increased concern for sustainability. In the future, operating licences will only be granted to qualified mining companies.

In Belém, the ITV offers a professional master's degree in the sustainable use of natural resources in tropical regions, which is currently in its third edition. Recognised by the Brazilian Ministry of Education's Graduate Education Support Agency (CAPES), this postgraduation course is the first of its kind to be offered by an institution linked to a company in the mining sector. The aim of this master's degree is to train professionals to be able to deal with issues related to the sustainable use of natural resources and attract and develop talented workers with skills in the area of mining. The course lasts for two years.

In Ouro Preto, the ITV has put together two specialization courses on open-pit mines and ore treatment. Both are offered to Vale professionals since the second half of 2015.

The third pillar of the ITV's activities is entrepreneurship, which aims to encourage the training of researchers and business owners so they can lead technology-based companies in the country. This type of initiative is very common overseas but is rarely seen in Brazil.

Below are some of the projects developed by the ITV:

Monitoring – Created by researchers from the ITV's Climate Change Research Group in Belém, the East Amazon Weather Forecast System, or Forecast Network, publishes daily weather forecasts that assist in the planning of actions by reducing the impact of extreme meteorological events. This tool, which is the first of its kind entirely developed by a private company in Brazil, monitors weather conditions and climate in the regions where the N4 and N5 iron ore mines are located in Carajás, in the southeast of Pará state; the Ponta da Madeira Maritime Terminal, in São Luís, and across the entire 893 kilometres of the Carajás Railway (EFC), which passes through 27 municipalities in the Brazilian states of Pará and Maranhão.

Microsensors – Vale and the *Commonwealth Scientific and Industrial Research Organization* (CSIRO) are developing a pioneering research project in the Amazon. Since June 2014, the behaviour of a group of 400 African bees has been monitored using microsensors installed in their thoraxes. This experiment is part of a wider study launched by CSIRO researchers in Tasmania, which is attempting to discover why the bee population is falling twice as fast than it was a few years ago. This phenomenon is known as Colony Collapse Disorder (CCD), which in the United States has already led to the death of 35% of insects bred in captivity. The researchers in the Amazon aim to observe the extent to which climate change, principally changes to rainfall patterns, is affecting the behaviour of insects.

Itacaiúnas – This project aims to monitor and understand processes in the rivers that are part of the Itacaiúnas river basin in the region of Carajás, in the southeast of Pará state. The idea is to improve the use of river water in the company's operations, understand seasonal variations and prevent extreme climatic events. In order to guarantee the collection of data, a Technical Cooperation Agreement was signed between the ITV, the Department of Environment for Pará (SEMA) and the National Waters Agency (ANA). The goal is to establish mutual cooperation between the participants involved in integration and modernization actions for the Itacaiúnas river basin's hydrometeorological network. The agreement establishes that the institute and SEMA are responsible for the installation, operation and maintenance of equipment in the eight stations that will collect data on the river basin.

Digital Plants – New technology developed by the ITV in Belém will streamline the identification of plant species. It is called the Digital Plants system and it allows information to be obtained on plants in real time simply using photographs of leaves, using information stored on a database. The project is being developed in partnership with the Federal University

of Pará (UFPA) and the State University of São Paulo (UNESP). Initial studies are being carried out at the Vale Nature Reserve, one of the largest protected areas of the Brazilian Atlantic Forest, which contains 2,800 different plant species.

Paleoclimate – This is an interdisciplinary study to evaluate how the Amazonian landscape has developed and evolved over the last 2.5 million years by observing the sediment accumulated at the bottom of oxbow lagoons in the mountains of Carajás. These lagoons may also provide information on the evolution of the iron ore found in Carajás. Studies began in the lagoons of Violão and Amendoim, in the southern mountains, and will be expanded to include other lagoons in Carajás. In addition, floristic registers based on pollen grains deposited in the sediment are assisting in the identification of the types of vegetation found in the region over time. For example, pollen from plants such as *Podocarpus*, *Myrsine*, *Weinmannia* and *Ilex*, typical of cold mountainous regions and such as the Andes, were very common in this region in the past. The study began in 2012 and is expected to last until 2018. In total, 48 oxbow lagoons have been identified in the Carajás mountains.

Swing Mines – Initiated in March 2015, this R&D program aims to define a plan for the implementation and operation of a highly reliable type of wireless broadband that may be used in Vale's mines in the future. Currently, wireless networks inside the company's mines are adjusted manually and on an ad hoc basis, impacting implantation and maintenance costs. Self-organizing Wireless Infrastructure for Next Generation (SWING) Mines investigate the use of *Remotely Piloted Aircraft Systems* (RPAS), more commonly known as drones, in the planning and optimization of wireless networks. RPAS can be used to carry out tridimensional surveys of mines, including on the morphological aspects that interfere in the final transmission of signals, and measure performance indicators on wireless networks in a way that is accurate, fast and safe, increasing the precision of prediction models.

Vale currently has authorization from the National Civil Aviation Agency (ANAC) to use RPAS at its operational sites as long as a series of requirements are met, such as altitude restrictions and visual control of the equipment by the operator. The work involving RPAS is the result of a Remote Railway Management project developed in 2014 in partnership with the Research and Development Institute (INDT) based in Manaus, in the state of Amazonas. The principal objective of the project is to analyse radio technology with the support of critical mission applications and recommend solutions, taking into consideration three technical scenarios for the modernization of wireless networks for the transmission of data on Vale's railways. In addition to laboratory tests on the equipment presented by our suppliers, two training courses on broadband digital communication systems were provided for the teams working on the EFVM and EFC railways.

Phosphate Flotation – A project being developed by the ITV in partnership with the Department of Mineral Technology at the University of Cape Town in South Africa and Vale Fertilizers is aiming to improve the performance of phosphate flotation cells, identifying possible faults in the system that may reduce the productivity of the equipment. The flotation technique is used during processing in order to concentrate the useful part of minerals. The process takes place in large containers (cells) containing ore slurry (water and mineral particles) and chemical reagents. Reacting with the chemical products and the slurry, the ore is separated into hydrophobic (water resistant) and hydrophilic (water friendly) particles. The hydrophobic particles tend to stick to air bubbles inside the equipment and are transported to a layer of foam on the surface, where they are removed. In phosphate mining, apatite is hydrophobically induced while impurities such as silica and iron sink to the bottom of the container. The South Africans have the know-how on this process and can perform a thorough analysis of these flotation circuits.

The project began in January 2014. In September, the first campaign arrived at the Catalão Mineral Chemical Complex, in the Brazilian state of Goiás, under the supervision of researchers from the University of Cape Town, with the aim of transferring this technology to the site. The ITV is currently analysing data, this time at the flotation site at the Cajati mine, in the state of São Paulo. Initial results at this site have demonstrated the possibility of reducing energy consumption by an average of 50% and the amount of chemical reagent used by 40%, as well as increasing the recovery rate of silicates

by around 5%. The project will continue until 2016, and an evaluation of the performance of flotation sites at the Tapira and Araxá mines in Minas Gerais state is expected to take place at a later date.

More information



Mônica Ferreira

monica.ferreira@vale.com

Rio de Janeiro

+55 (21) 3845-3636

Murilo Fiuza

murilo.fiuza@vale.com

Rio de Janeiro

+55 (21) 3485-3627
