The genomics revolution

The DNA of protection, preservation, and profit

STEVE ARMSTRONG, PHD, PRESIDENT & CEO, GENOME ATLANTIC

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Nova Scotia is blessed with an abundance of forests, rivers and lakes, a vibrant coastline, and expansive agricultural lands. Having a healthy environment is intrinsically the right thing to do, but it's also essential for the businesses that rely on land or sea for their raw materials.

Any company who depends on the environment needs to understand the complex ecosystems in which they operate — right down to the DNA. And that's where genomics comes in.

Genomics is the powerful combination of genetics, biology and computer science that unlocks the mysteries found within every living thing. It's a cutting edge technology that has become exponentially cheaper and more accessible over the last decade. This has increased its uptake in a range of sectors of importance to Nova Scotia, including human health, agriculture, aquaculture, forestry, mining, energy and, more recently, the environment.

Genome Atlantic works with a range of forward-thinking companies, researchers, governments and other partners to ensure that this ground-breaking technology brings real benefit to the region.

For example, genomics can help companies fine-tune their environmental monitoring techniques. Scientists use genomics to identify the presence or absence of organisms based on their DNA. This can provide a more accurate and cost-effective approach than traditional monitoring methods, particularly in aquatic settings.

Some microbes metabolize (eat) hydrocarbons, which means they can help clean up oil spills. Genomics is helping us understand what communities of microbes thrive on oil and how they interact with their environment, so that companies can better leverage this natural environmental remediation tool in the event of an oil spill.

In other cases, genomics helps us identify the microbes that can clean up contaminated industrial sites. Scientists have turned this knowledge into a patented microbial mixture that is sold around the world to deal with toxic substances.

Some are taking the idea of using microbes even further, using them to replace the chemicals used to leach minerals from tailings ponds in mine sites. In that case, genomics is helping companies avoid environmental contamination, while extracting more value from a mine's assets.

Looking even broader, many Nova Scotian companies are interested in converting waste products into energy and other value added products. Genomics can give these companies an edge by helping them understand which microbes are best for the job.

Genomics can also tackle environmental issues in the agricultural sector — a huge part of Nova Scotia's economy. We can use genomics to develop better pest and disease management practices, which can reduce the need for chemical inputs. Genomics can also help to refine breeding programs so that plants can naturally withstand drought and other environmental impacts. Nova Scotia's grape growers and other producers could gain a significant advantage by incorporating this into their long-term plans.

Companies that embrace genomics-based solutions to meet environmental challenges have the potential to be triple-bottom-line leaders in sustainability, profitability and social responsibility. Genome Atlantic, along with other members of the innovation ecosystem can be valuable allies to help companies take advantage of this phenomenal opportunity.

Steve Armstrong, PhD, is President & CEO of Genome Atlantic, a not for profit corporation that has worked with a range of regional partners to enable over $86 million in genomics research and development.