

## UPDATES

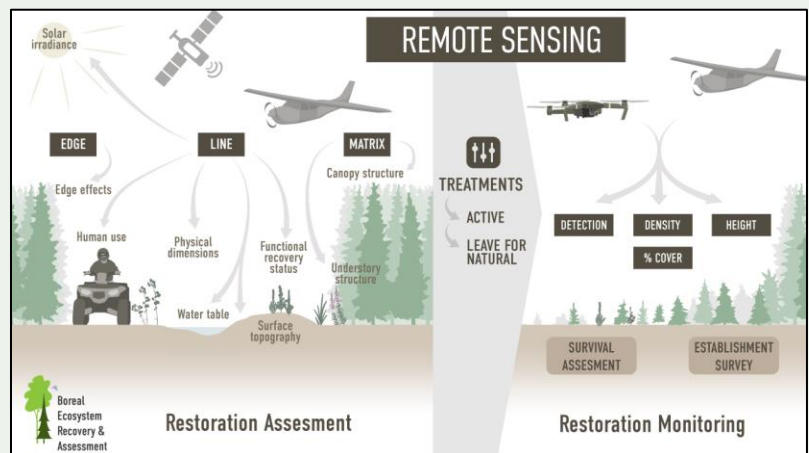
BERA welcomes new researchers [Irina Terentieva](#) (PDF, Remote Sensing Team), [Marissa Davies](#) (PDF, Soils and Ecohydrology Team), [Colleen Sutheimer](#) (PhD student, Vegetation Team), and [Nazia Tabassum](#) (PhD student, Soils and Ecohydrology Team).

### New Publications:

- [Effects of wildfire and soil compaction on recovery of narrow linear disturbances in upland mesic boreal forests](#)
- [Satellite time series and Google Earth Engine democratize the process of forest-recovery monitoring over large areas](#)

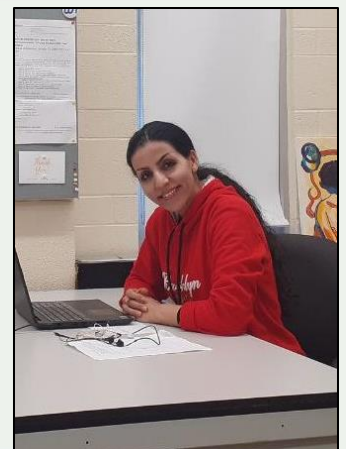
## BERA'S PHASE II RESEARCH PRIORITIES

It's been a busy winter, with the BERA team ramping up its Phase 2 (2021 – 2026) project cycle! Our annual research workshop was largely devoted to outlining the [strategic priorities](#) and [tactical deliverables](#) that our program has committed to. BERA's research teams are expanding rapidly, and the program's [table of projects](#) is filling out nicely. All BERA research is grounded in [process diagrams](#) that relate our team's activities to physical processes operating in and around industrial disturbances. We invite you to [explore these](#), and to reach out if you would like to learn more.



## RESEARCHER PROFILE

[Maryam Bayatvarkeshi](#) is a Ph.D. student on in the Soils and Ecohydrology group working under the supervision of Maria Strack and Scott Ketcheson. Maryam's research focuses on the cumulative effects of industrial disturbances on water balance in boreal watersheds. Determining how disturbance affects local water balance will help our understanding of hydrologic controls on return to forest cover and carbon dynamics. By applying hydrologic models to understand the effect of disturbance, results can be extended beyond local study areas.





## RESEARCH HIGHLIGHTS (1 OF 2)

### How smartphones can help us track the effects of peatland disturbances

There is a critical need for accessible, low-cost, and non-destructive methods to record the impacts of disturbances in peatlands. This will not only help us understand how these ecosystems function but more importantly, help us monitor and map shifts in carbon storage and exchange.

One innovative method involves looking at plant phenology or how the plants green up over the growing season. How quickly and how much plants green up over the growing season can influence productivity and the carbon balance in peatlands. We tested the use of regular smartphone photographs to calculate plant **greenness**. This allowed us to understand how disturbances such as seismic lines affect productivity using readily-available sensors.



### Applying this method in two boreal peatland types in northern Alberta showed:

Max greenness peaked 1-3 weeks earlier on seismic lines.



Greenness was related to species composition and was a good predictor of plant productivity.



Colour indices reflected differences in plant composition, typically with more mosses and lichens in the peatland and more sedges and willows on seismic lines.



#### BOG

Vegetation on seismic lines was both greener and had more red pigmentation than in the surrounding peatland.

#### FEN

The undisturbed peatland was greener in the spring but resembled the disturbed seismic lines by the end of summer.

This easy-to-use, affordable method can be easily scaled up for rapid monitoring of disturbances and can also be used to monitor the trajectory of restored peatland sites and their carbon balance.



Seismic lines significantly impact the greenness of boreal plant communities, with disturbed areas becoming more productive faster. Using smartphones to collect photographs provided a quick and easy method to collect greenness data without the need for expensive equipment or fixed infrastructure. Furthermore, our ability to link the easy-to-measure greenness indices with productivity measurements also shows promise as a way to monitor and map shifts in peatland carbon exchange in response to linear disturbances and recovery over time.

For the full article click [here](#).



## RESEARCH HIGHLIGHTS (2 OF 2)

### Using Remote Sensing to Monitor Forest Recovery

Effective forest monitoring requires mapping and detecting changes over very large areas. Forest disturbance can easily be detected using satellite imagery, but forest recovery is a slower and more complex process that is not as easily detected. To monitor forest recovery more easily, we developed a workflow using open-access satellite imagery and cloud-based tools (Google Earth Engine).

SHORT ABRUPT CHANGE      LONG GRADUAL CHANGE

FOREST SIGNAL

Using our workflow, we produced an open-access dataset of forest harvest recovery in Alberta that spans 34 years. Through this tool we determined:

Different ecological regions — Boreal, Foothills, and Rocky Mountain — show variability in starting conditions and rates of recovery.

Spectral measures of recovery capture biomass and structural complexity at a landscape-level.

They are complementary but not equivalent to on-the-ground measures of vegetation community status or ecological function.

Areas with higher elevations and less favourable growing conditions take more time to recover

To access our custom Google Earth Engine visualization tool visit:  
<https://abmipc.users.earthengine.app/view/harvest-area-spectral-regen-2018>

The ability to develop easily reproducible, adaptable, and scalable methods for generating maps of forest disturbance and recovery is vital to forest health. Next steps aim to enhance understanding of the relationship between spectral and on-the-ground measurements. To download our dataset, visit [abmi.ca](http://abmi.ca)

ABMI  
Alberta Biodiversity Monitoring Institute

BOREAL ECOSYSTEM RECOVERY & ASSESSMENT

HIRO ET AL., 2021 DOI: 10.3390/RS13234745  
INFORMATION & COMMUNICATIONS TECHNOLOGY

Up-to-date monitoring of forest disturbance and recovery over large areas is a critical challenge for researchers and land managers. BERA research partners at the Alberta Biodiversity Monitoring Institute have taken a step towards democratizing this process. They did this by developing a repeatable, scalable, and adaptable workflow for capturing broad patterns in post-harvest forest regeneration using long-running satellite image archives and Google's Earth Engine platform. Their work produced a [public dataset](#) of Alberta-wide harvest area spectral regeneration available at <http://www.abmi.ca>.

To read the peer-reviewed article behind this research, click [here](#).

