



## Questions & Answers Session 1

Please type your questions in the Question Box. We will try our best to get to all your questions. If we don't, feel free to email Amber McCullum ([amberjean.mccullum@nasa.gov](mailto:amberjean.mccullum@nasa.gov)), Alex Zvoleff ([azvoleff@conservation.org](mailto:azvoleff@conservation.org)), and/or Monica Noon ([mnoon@conservation.org](mailto:mnoon@conservation.org)).

Question 1: How can I analyze LDN sub indicator at watershed level?

Answer 1: [Alex]: This is something we'll get into in more detail in part 2 when we talk about how to use custom datasets in Trends.Earth. It's possible to use data you've derived yourself. E.g., if you've produced a land cover map of your watershed, you can use that within Trends.Earth. The same is true for productivity and SOC. We'll get into this in the second webinar, but remember we're drawing on global datasets for default data which is around 300 m in resolution, so of course watersheds can vary in scale and make sure you're using a dataset of appropriate resolution.

Question 2: Will Trends.Earth be available for QGIS 3 versions? Can we run Trends.Earth on QGIS on 2.18.9?

Answer 2: [Alex]: Yes, we're working on a version of Trends.Earth for QGIS3. So that's something we're aware of and we will reach out via our website and via our list to provide more details when that version is available. Re:part 2: the answer is maybe. We recommend QGIS 2.18.15 or greater - there are just some issues that might pop up if using an earlier version. We can't guarantee it'll work correctly if you use a prior version.

Question 3: What are the weaknesses of NDVI as an indicator of land degradation?

Answer 3: [Alex]: So this is a larger question we could spend a lot of time on, but 2 things: first, remember there are 3 indicators we're using to assess land degradation. Land cover, SOC, in addition to land productivity. Remember it's the interaction of those 3, one all-out method being applied that results in a final map that isn't based on land productivity alone. Secondly, as far as NDVI itself as an indicator, we're using NDVI as an indicator of land productivity, not directly as land degradation. There's been a lot of research on changes in NDVI and productivity. There are limitations as



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with any indicator derived from RS. NDVI can saturate in heavily forested regions, but remember there are multiple indicators going into the final map of land degradation. It's possible to load custom productivity, we will show an example of custom land cover in the second session. We won't go into methods & details in that session, but there are other approaches you can use. You can see more details on our website, looking at rain use or water use efficiency.

Question 4: What are you using to develop the annual LC maps? We're involved in a process to generate this type of maps in Eastern Africa (paper in review...). It would be interesting to see areas of collaboration.

Answer 4: [Alex]: Certainly - and feel free to reach out to us and see a potential in collaboration, we do have field teams in Africa - most heavily in Eastern Africa - so feel free to reach out. The annual land cover maps you see in the tool are developed by us. The default maps are developed by ESA CCI land change dataset (not CI, developed by ESA), but there is the potential, as we'll talk about next week, to load your own land cover maps into the tool if you are developing your own LC maps. We also do have other projects at CI where we've developed LC maps for East Africa we'd be happy to share if there's interest. I'd encourage you to reach out to RCMRD. They've done a fair amount of work mapping land cover partnered with the NASA SERVIR program.

Question 5: What about using the tropical above ground woody biomass data layers like Baccini (or similar)?

Answer 5: [Alex]: So this is something we've looked into, and I'll hand this over to Mariano. You didn't hear from him this morning, but he'll be leading the Spanish sessions this afternoon.

Mariano: That's a great question - we have looked into it. There's - the above ground biomass datasets have a lot of potential to assess land degradation. We see that as the future direction of monitoring degradation particularly for productivity. The limitation at this point is we don't really have datasets that assess change over time. We can use Baccini to set up baselines, but we don't have one to derive change. We can create these annual composites that allow us to track change over time. We do cover above ground biomass in the tool, we didn't have time to cover it in the webinar. [] changes in above ground biomass, cover, it's not specifically targeting SDG 15.3.1, but it does inform changes in biomass. You can access that from Trends.Earth



Question 6: Why do you use SOC as an indicator when you are using land cover and, from land cover, you could estimate above ground carbon?

Answer 6: [Mariano]: Yes, we could - we're following the guidelines. The indicators were defined as part of the UNCCD process. A technical process and a consultation with country members. So, SOC was the dataset that provided the reference information for doing these assessments. We're using SOC that uses land cover in the model. Also this aligns with IPCC reporting that uses changes in land cover to inform changes in SOC and so it made sense to align reporting with the other conventions as well.

Question 7: Assuming that woody encroachment would show up as improving SOC, how would you represent that appropriately if you are trying to maintain grasslands?

Answer 7: [Alex]: Here, it's important to remember there are 3 different indicators. If you're trying to maintain grasslands, it's important to look at the transition matrix and whether each transition type is pos/neg and what's appropriate for your area. Given the indicators are combined in a one in all out scenario, if you transition from forest to grassland, that will be [degradation, you need to have an accurate land cover map to ensure you're mapping degradation appropriately in your area. For all projects, even in the case of woody encroachment, we encourage you to look at the transition matrix. It's the default in the tool and default based on guidance - it's important to make sure the definitions in that matrix make sense locally.

Question 8: What is the scale that Trends.Earth is mainly used? I would like to use it on a 1:25000 scale in a watershed where a hydroelectric power plant is located

Answer 8: [Alex]: Got into this a little bit in response to Q1. In terms of scale, it's mainly used - it was originally designed to support countries and support their work on UN Desertification. So many were at a national scale. Given the resolution of the data (300m) it can be used below national level for most countries, for e.g., for project monitoring, but the original user base was national scale. We're working hard to incorporate finer resolution datasets. So stay tuned, we'll be supporting higher res data by default.

Question 9: While clipping the result to a boundary file, what CRS must the shapefile be in?



Answer 9: [Monica]: It actually doesn't matter what coordinate system you're using, but it does need to be defined. If you have an undefined polygon, it won't work in the tool - make sure you define a projection. It will calculate it in GEE if you define it.

Question 10: Can you use different dates for evaluation? How far in the past can you evaluate?

Answer 10: [Monica]: This is dependent on what we have as default datasets. We have AVHRR, which we use for calculating NDVI, but that only goes back to 1981. The land cover dataset from ESA CCI land cover project goes back to 1992. In theory, you could run it for any time period if you have your own datasets. Of course, NDVI from MODIS only goes back to mid-2000s, which is why we have it starting by default in 2001.

Question 11: Where does the land cover layer come from? If I have a classified image at more fine scale, will it work with these tools?

Answer 11: [Monica]: There is - it comes from ESA CCI (Climate Change Initiative) land cover project. 1992-2015 with annual land cover datasets. But they're at 300 m resolution. Next week we'll cover how to upload custom datasets. If you want to upload land cover - as long as you have two time steps, you can use any of your own classified images at a finer scale. It will work with the tool and we'll demonstrate that next week. We recommend you use a validated land cover project and they were both done using the same methodology so they're comparable.

Question 12: What is the maximum size of shapefile you can run an analysis on trends.earth? Is there any specific shapefile type you need kml, shp, kmz?

Answer 12: [Alex]: In response to the latter part, you can use kml or shp. If you have a different file type you can convert it within QGIS to kml or . For the first part, right now we don't have a public limit we've released, but let us know if you have issues. We've designed it to work on the national scale. If you try and run it larger than a country, it's likely to fail. Given its public, it draws on GEE, and we don't guarantee the tool works beyond the national scale. But if you're interested in analysis at a large scale, contact us.

Question 13: Will this tool has a version works with ArcGIS?



Answer 13: [Alex]: The tool is free and open source, so the code is all out there. If there are those interested in building one for Arc, that's possible, but we're focusing on QGIS. That's where our focus is. All the methods for the code is freely available.

Question 14: How do I account for the wildfire in the area? There would be natural degradation in that area as well?

Answer 14: [Alex]: This would depend a bit on when the wildfires occurred and what their impact was. It's possible it could result in LC change which would be detected in the dataset. Unlikely if it's a smaller scale fire. It could be detected in the productivity. If it's sufficiently large - it'll depend on when it occurs. It would be better to bring in other datasets bringing in wildfire occurrence. Those aren't available currently within Trends.Earth, but I would recommend pulling on a dataset evaluating fire. We do have a project in CI (FIRECAST) that's focused on directly assessing fire.

Question 15: Where does the land cover layer come from? If I have a classified image at more fine scale, will it work with these tools?

Answer 15: [Alex]: Addressed in earlier question. ESA - yes, it will work at a finer scale.

Question 16: Are there API tools for pulling calculations directly from the platform or must all analyses be iterated by hand?

Answer 16: [Alex]: Yes, there is an API you can use to pull calculations directly from, but it isn't documented at the moment. If you're interested, reach out to us. It's on the list, but it isn't currently documented.

Question 17: Which is better in presenting land/soil degradation? Qualitative (in terms of low degradation to highly degraded) or quantitative data?

Answer 17: [Alex]: I think it would depend on the purpose of the analysis you're trying to do. At the national scale, I see there is a lot of value in a standardized approach, but it can be difficult in a qualitative approach. There's a lot a qualitative approach can do. But land degradation at the end of the day is subjective. If you have qualitative data you can draw on - this is beyond what we do at Trends.Earth, but I recommend drawing on it if you have it.

[Mariano]: one thing I would add - the key use we've found for qualitative data is to identify the drivers of degradation. Which is critical once you have the assessment to



figure out how you're going to solve it. The quantitative data you get from RS and the qualitative data you get from area experts.

Question 18: Has any effort in developing Land Use Land cover maps utilizing SAR imagery using this plugin?

Answer 18: [Mariano]: We have noticed a lot of interest in users generating land cover datasets using SAR or optical remote sensing like Landsat or Sentinel. It's something we're analyzing, but haven't committed to. Given that generating LC datasets has its own issues. We want to be sure we're providing good quality data. We're evaluating it and we'll hopefully make it happen.

Question 19: Do you have list of spatial statistical tools to use in performing correlation analysis with factors of land degradation?

Answer 19: [Mariano]: The short answer is no. We do not have that. If you have something in mind, let us know and we'll make sure to incorporate that.

Alex: In terms of - I'd recommend looking at work from world atlas desertification. That approach in most recent edition looks at preponderance of evidence approach to combine RS data with other datasets you expect to correlate with degradation. That might give you an idea of some of those factors, but a way to consider them together.

Question 20: How do you measure the correlation between climate change impacts and land cover degradation in an area of interest? How do you quantify the effects of climate change on the land and communicate it to the public?

Answer 20: [Mariano]: In the tool, there are many different functionalities we didn't have time to cover. We talked about trends in NDVI - I don't know if we'd call it climate change or trends in precip, temperature, 10-15 years, but the tool has functionalities for incorporating those changes into the trend analysis of NDVI. For those of you familiar, you can run other productivity analyses that incorporates variability in precip, soil moisture, and you can use rain use efficiency/water use efficiency to separate the effect from land use and changes in climate. That is a functionality included in the tool. Please explore the website to assess those different options

Question 21: How can you differentiate between anthropocentric and climatic degradation?



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Answer 21: [Alex]: (refer to Q20) Yes - consider what Mariano just said above. Because those are the methods we've integrated.