## 1. code for quantifying area changes in natural forests

https://code.earthengine.google.com/64a50c3fe636d301a740a5010a78597c?noload=true

This script measures changes in natural forest area across four structural classes for 2001, 2004, and 2020. Using satellite-derived datasets for canopy cover, height, and land use, it identifies natural forest extent for each year through threshold criteria and temporal consistency checks. The 2001 forest extent is stratified into four structural categories based on canopy cover and height. The script then quantifies the area within each category that remained forest in 2001, 2004, and 2020. These persistent forest areas are aggregated within predefined grid cells using zonal statistics, expressed in million hectares, and exported as partitioned geospatial vector datasets for further analysis.

## 2. code for quantifying areas of deforestation and degradation in natural forests

https://code.earthengine.google.com/bd3b45856809484d22f0940dc05b598d?noload=true

This script quantifies natural forest loss - distinguished as deforestation and degradation - between 2001 and 2020. Using satellite-derived datasets for canopy cover, height, land use, and pre-computed change detection layers for both years, it first identifies the 2001 natural forest extent. This extent is stratified into four structural classes based on initial canopy cover and height. The script then detects pixels that experienced deforestation (land use change) or degradation (significant loss in cover or height) by 2020. For each loss type - deforestation, degradation, cover-specific degradation, and height-specific degradation - it calculates the total area within each structural class. These areas are aggregated in million hectares within predefined grid cells using zonal statistics and exported as chunked geospatial vector files.

## 3. code for mapping the spatial distribution of natural forest loss

https://code.earthengine.google.com/76e420ddd39585c47bd98c5233177f95?noload=true

This script maps the spatial distribution of natural forest loss between 2001 and 2020, categorized by loss type and initial forest structure. It first identifies the 2001 forest extent, stratified into four structural classes based on canopy cover and height. It then detects pixels that underwent deforestation (land use change) or degradation (significant loss in cover or height) by 2020. The script computes the area for each loss category - total loss, deforestation, degradation, cover-specific degradation, and height-specific degradation - originating from each structural class. These areas are aggregated in million hectares within a global hexagonal grid using zonal statistics and exported as chunked geospatial vector files to facilitate analysis of loss patterns.

## 4. code for mapping the spatial distribution of different risks

https://code.earthengine.google.com/3c86dd7487317d28739745145a6e0cd2?noload=true

This script generates spatial masks representing potential risks of natural forest change between 2001 and 2020. It uses the 2001 natural forest extent as a baseline mask and incorporates datasets for areas affected by drought, fire, and forest fragmentation, with fragmentation categorized by edge proximity zones (0-500m, 500-1000m, 1000-1500m). Additionally, it analyzes land use code transitions from 2001 to 2020 to derive layers indicating human influence, such as shifts to managed forests or non-forest anthropogenic uses, including deforestation linked to high human modification or intermittent management. The output is a set of binary raster layers, each mapping the spatial extent of natural forest area exposed to a specific risk.

### 5. code for quantifying natural forest loss under different risk exposures

https://code.earthengine.google.com/3396a591da0cf1e0f38514b98509cfe8?noload=true

This script quantifies natural forest loss under different risk exposures between 2001 and 2020, focusing on one loss type and initial forest structure class per run (e.g., degradation in open high forests). It combines masks of the target forest loss with binary layers for risks such as drought, fire, fragmentation, and human influence. For pixels with the selected loss type, it calculates the area linked to each risk using three methods: exclusive (only that risk), inclusive (risk present, possibly with others), and proportional (area divided by the number of risks). Loss area not overlapping any risk is also quantified. These areas are aggregated in million hectares within grid cells using zonal statistics and exported as chunked geospatial vector files.

### 6. code for mapping the spatial extent of natural forest loss under different risk exposures

https://code.earthengine.google.com/c5be92487f4ed4e10f5413f2d1edfc72?noload=true

This script maps the spatial distribution of natural forest loss (configurable as total loss, deforestation, or degradation) exposed to various risks between 2001 and 2020. It overlays the selected forest loss mask with binary layers for risks such as drought, fire, fragmentation, and human influence. Within each cell of a global hexagonal grid, it calculates two metrics for each risk: the area of the selected forest loss intersecting the risk's footprint and the area within the 2001 forest extent influenced by that risk. These areas, along with loss not overlapping any risk, are aggregated in million hectares and exported as chunked geospatial vector files, enabling analysis of risk impacts on forest loss.

### 7. code for quantifying the proportion of natural forest loss occurring under different risk exposures

https://code.earthengine.google.com/7327b96d8d6b8947c1427e4ebb094902?noload=true

This script computes the spatial association between natural forest loss and potential risks, facilitating the calculation of loss proportions under risk exposure. It operates on user-defined forest loss categories (e.g., total loss, degradation) and initial forest types (e.g., all 2001 forest, specific structural classes), overlaying these with binary masks for risks such as drought, fire, fragmentation, and human influence. For each grid cell in a global rectangular partition, it quantifies, for each risk, the area of specified forest loss intersecting the risk's footprint and the total initial area of the specified forest type exposed to that risk. Loss area outside any risk footprint is also calculated. These areas are aggregated in million hectares and exported as chunked geospatial vector files.

### 8. code for quantifying the proportion of natural forest loss under risks relative to total loss

https://code.earthengine.google.com/045c334cd7c93c4c78f0bb8f93e6cfa2?noload=true

This script calculates the proportion of natural forest loss (deforestation or degradation between 2001 and 2020) that coincides with at least one potential risk. It uses masks for the selected loss type and a composite mask representing the union of areas affected by risks such as drought, fire, fragmentation, and human influence. For each cell in a global hexagonal grid, it computes two metrics: the total area of the specified forest loss and the area of that loss overlapping the combined risk footprint. These areas are aggregated in million hectares and exported as chunked geospatial vector files.

### 9. code for estimating AGB in stable forests

https://code.earthengine.google.com/205bd4b2b5a629c73ae180be97dd09cd?noload=true

This script estimates the mean AGB within stable natural forest extents circa 2020. It uses satellite-derived datasets for canopy attributes from 2001 and 2020 to identify persistent natural forest areas, refining this mask to exclude forest edges and regions with recent disturbance or growth signals, thus isolating stable forest cores. These stable pixels are intersected with a reference mean AGB map (ESA CCI, averaged 2018-2021). The script calculates and aggregates the mean AGB within these areas using zonal statistics across different spatial grids, producing a mosaicked raster dataset representing average AGB in stable natural forests.

### 10. code for quantifying AGB reductions due to natural forest loss

https://code.earthengine.google.com/806912f306624555b830d030e6e32b00?noload=true

This script quantifies AGB associated with natural forest loss between 2001 and 2020, stratified by initial forest structure. It uses user-defined forest loss masks (e.g., total loss, deforestation, degradation), masks for four initial structural classes based on 2001 canopy cover and height, a contemporary AGB dataset (ESA CCI), and a pre-computed stable forest AGB map. For pixels undergoing the specified loss type from each structural class, it calculates the total area (hectares) and estimates AGB stock using both contemporary and stable forest AGB maps. These values are aggregated via zonal statistics within grid cells and exported as chunked geospatial vector files, enabling assessment of AGB reduction by loss type and initial forest condition.

### 11. code for mapping the distribution of AGB reductions due to natural forest loss

https://code.earthengine.google.com/c672fc650ef2a70c7a7c44c01c1281d5?noload=true

This script maps the spatial distribution of AGB reduction from natural forest loss between 2001 and 2020. It uses masks for total loss, deforestation, and degradation, along with reference AGB maps for stable forests and contemporary conditions (ESA CCI, 2020). For each pixel with loss, it calculates potential AGB reduction by subtracting contemporary AGB from stable forest AGB and multiplying by pixel area (hectares). These pixel-level reductions are summed within each cell of a global hexagonal grid for total loss, deforestation, and degradation using zonal statistics. The aggregated AGB reductions (Mg per hexagon) are exported as chunked geospatial vector files.

### 12. code for quantifying AGB reductions due to natural forest loss under different risk exposures

https://code.earthengine.google.com/88d6731197e733dae686ad6532b10e80?noload=true

This script quantifies AGB reductions due to natural forest loss under different risk exposures between 2001 and 2020, focusing on one loss type and initial forest structure class per run (e.g., degradation in open high forests). It combines masks of the target forest loss with binary layers for risks such as drought, fire, fragmentation, and human influence. For pixels with the selected loss type, it calculates the area linked to each risk using three methods: exclusive (only that risk), inclusive (risk present, possibly with others), and proportional (area divided by the number of risks). Loss area not overlapping any risk is also quantified. These areas are aggregated in million hectares within grid cells using zonal statistics and exported as chunked geospatial vector files.