Coastal agriculture Google Earth Engine open-source code
(developed by authors for determining the spatial distribution of global coastal agricultural landscapes)

Global impact of seawater intrusion on coastal agriculture
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// STEP 1.  LAND COVER: EXTRACT CROPLAND LOCATIONS //
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// a. import 2019 CGLS-LC100 land cover with 100m resolution

var CGLS_LC100_19 = ee.Image("COPERNICUS/Landcover/100m/Proba-V-C3/Global/2019");
var lc2019 = CGLS_LC100_19.select("discrete_classification");

Map.addLayer(lc2019, {}, 'discrete_classification');

// b. select "cropland" class only

var cropland_global = lc2019.eq(40).updateMask(lc2019.neq(0));

Map.addLayer(cropland_global, '', 'cropland_global')

// c. add buffer

Map.addLayer(table, '', 'Buffer_coastline')

// d. Clip cropland to buffer

var Clip_cropland = cropland_global.clip(table) // Import the shapefile representing a 100-km buffer of the global coastline as an asset (table).You can access the shapefile in the current shapefile repository

Map.addLayer(Clip_cropland, '', 'Buffer_cropland')

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// STEP 2.  SLOPE: EXTRACT DTM //
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// a. Select DEM Copernicus and clip mean DEM image to buffer

var dataset = ee.ImageCollection('COPERNICUS/DEM/GLO30');
var dataset_clipped = dataset.mean().clip(table)
var elevation = dataset_clipped.select('DEM');
var elevationVis = {
  min: 0.0,
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  max: 1000.0,
  palette: ['0000ff','00ffff','ffff00','ff0000','ffffff'],
};

Map.addLayer(elevation, elevationVis, 'elevation_coastline');

// b. Select DEM image lower than 10 m

var maxElevation = 10;
var elevationMask = elevation.lt(maxElevation);

var elevation_coastline_lt10 = elevation.mask(elevationMask)

Map.addLayer(elevation_coastline_lt10, elevationVis,'elevation_coastline_lt10');

// c. Transform mask into 1 - nodata values

var NoData = 0;

var elevation_lt10_mask =
elevation_coastline_lt10.lt(10).updateMask(elevation_coastline_lt10.neq(NoData));

Map.addLayer(elevation_lt10_mask, '', 'elevation_lt10_mask');

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// STEP 3.  MULTIPLY RASTERS: EXTRACT CROPLAND IN COASTLINE //
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// a. Multiply Clipped coastal cropland and Clipped coastal DEM rasters

var Coastal_cropland_1_0 = elevation_lt10_mask.multiply(Clip_cropland);

// b. Transform mask into 1 - nodata values

var Coastal_cropland =
Coastal_cropland_1_0.eq(1).updateMask(Coastal_cropland_1_0.neq(NoData));

Map.addLayer(Coastal_cropland,'', 'Coastal_cropland');

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// STEP 4.  EXPORT COASTAL CROPLAND //
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//// a. define global coverage for export

var geometry = ee.Geometry.Rectangle([-179,-58,179,78], null, false);

// b. export raster to Google Drive folder (files are automatically split into tiles)
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Export.image.toDrive({
image: Coastal_cropland,
description: 'Coastal_cropland',
scale: 100,
region: geometry,
maxPixels: 1e11});
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