

Supplementary material

Forest loss related to Brazil nut production in non-timber forest product concessions in a micro-watershed in the Peruvian Amazon

Table S1. Landsat image database information.

Sensor	Path Row	Image Date
Landsat 5 TM	002 68	July 22, 2004
Landsat 5 TM	002 69	July 22, 2004
Landsat 5 TM	003 68	August 14, 2004
Landsat 5 TM	002 68	June 7, 2005
Landsat 5 TM	002 69	June 7, 2005
Landsat 5 TM	003 68	May 6, 2005
Landsat 5 TM	002 68	August 13, 2006
Landsat 5 TM	002 69	August 13, 2006
Landsat 5 TM	003 68	August 4, 2006
Landsat 5 TM	002 68	July 31, 2007
Landsat 5 TM	002 69	July 31, 2007
Landsat 5 TM	003 68	August 23, 2007
Landsat 5 TM	002 68	August 18, 2008
Landsat 5 TM	002 69	July 17, 2008
Landsat 5 TM	003 68	August 25, 2008
Landsat 5 TM	002 68	August 5, 2009
Landsat 5 TM	002 69	May 1, 2009
Landsat 5 TM	003 68	August 12, 2009
Landsat 5 TM	002 68	August 24, 2010
Landsat 5 TM	002 69	August 24, 2010
Landsat 5 TM	003 68	August 15, 2010
Landsat 5 TM	002 68	August 27, 2011
Landsat 5 TM	002 69	August 27, 2011
Landsat 5 TM	003 68	August 18, 2011
Landsat 7 ETM+	002 68	August 21, 2012
Landsat 7 ETM+	002 69	August 5, 2012
Landsat 7 ETM+	003 68	August 12, 2012
Landsat 8 OLI	002 68	August 16, 2013
Landsat 8 OLI	002 69	August 16, 2013
Landsat 8 OLI	003 68	July 22, 2013
Landsat 8 OLI	002 68	August 19, 2014
Landsat 8 OLI	002 69	August 19, 2014
Landsat 8 OLI	003 68	August 10, 2014
Landsat 8 OLI	002 68	August 22, 2015

Landsat 8 OLI	002 69	August 22, 2015
Landsat 8 OLI	003 68	July 28, 2015
Landsat 8 OLI	002 68	August 24, 2016
Landsat 8 OLI	002 69	August 24, 2016
Landsat 8 OLI	003 68	July 30, 2016
Landsat 8 OLI	002 68	August 11, 2017
Landsat 8 OLI	002 69	August 11, 2017
Landsat 8 OLI	003 68	August 2, 2017
Landsat 8 OLI	002 68	August 30, 2018
Landsat 8 OLI	002 69	August 30, 2018
Landsat 8 OLI	003 68	July 20, 2018
Landsat 8 OLI	002 68	August 17, 2019
Landsat 8 OLI	002 69	August 17, 2019
Landsat 8 OLI	003 68	August 24, 2019
Landsat 8 OLI	002 68	August 19, 2020
Landsat 8 OLI	002 69	August 19, 2020
Landsat 8 OLI	003 68	August 26, 2020

Source: Google Earth Engine (GEE) [29].

Table S2. Land cover legend adapted to study area.

Level I	Level II
1. Artificialized areas	1.1 Urbanized areas
	1.2 Industrial areas and infrastructure
	1.3 Mining and infrastructure extraction areas and waste sites
2. Agricultural areas	2.1 Transient crops
	2.2 Permanent crops
	2.3 Pastures
	2.4 Heterogeneous agricultural areas
3. Forests and mostly natural areas	3.1 Forest
	3.2 Planted Forests
	3.3 Areas with herbaceous and/or shrubby vegetation
	3.4 Areas with little or no vegetation
4. Continental wetlands	4.1 Continental wetland areas
5. Water surface	5.1 Inland waters

Source: MINAM [73]; taken and adapted from CORINE Land Cover [34].

Table S3. Land use in the study area.

Years	Categories (ha)	
	Forest and mostly natural areas	Agricultural areas
2004	348021.26	6197.41
2005	347548.22	6670.43
2006	347522.61	6696.05
2007	347400.90	6817.75
2008	347170.88	7047.78
2009	347004.00	7214.66
2010	346834.35	7384.31
2011	346645.34	7573.33
2012	346573.96	7644.70
2013	346197.09	8021.57
2014	345869.54	8349.12
2015	345475.64	8743.02
2016	345237.79	8980.87
2017	345249.64	8969.01
2018	345450.26	8768.41
2019	345079.94	9138.71
2020	344783.54	9435.12

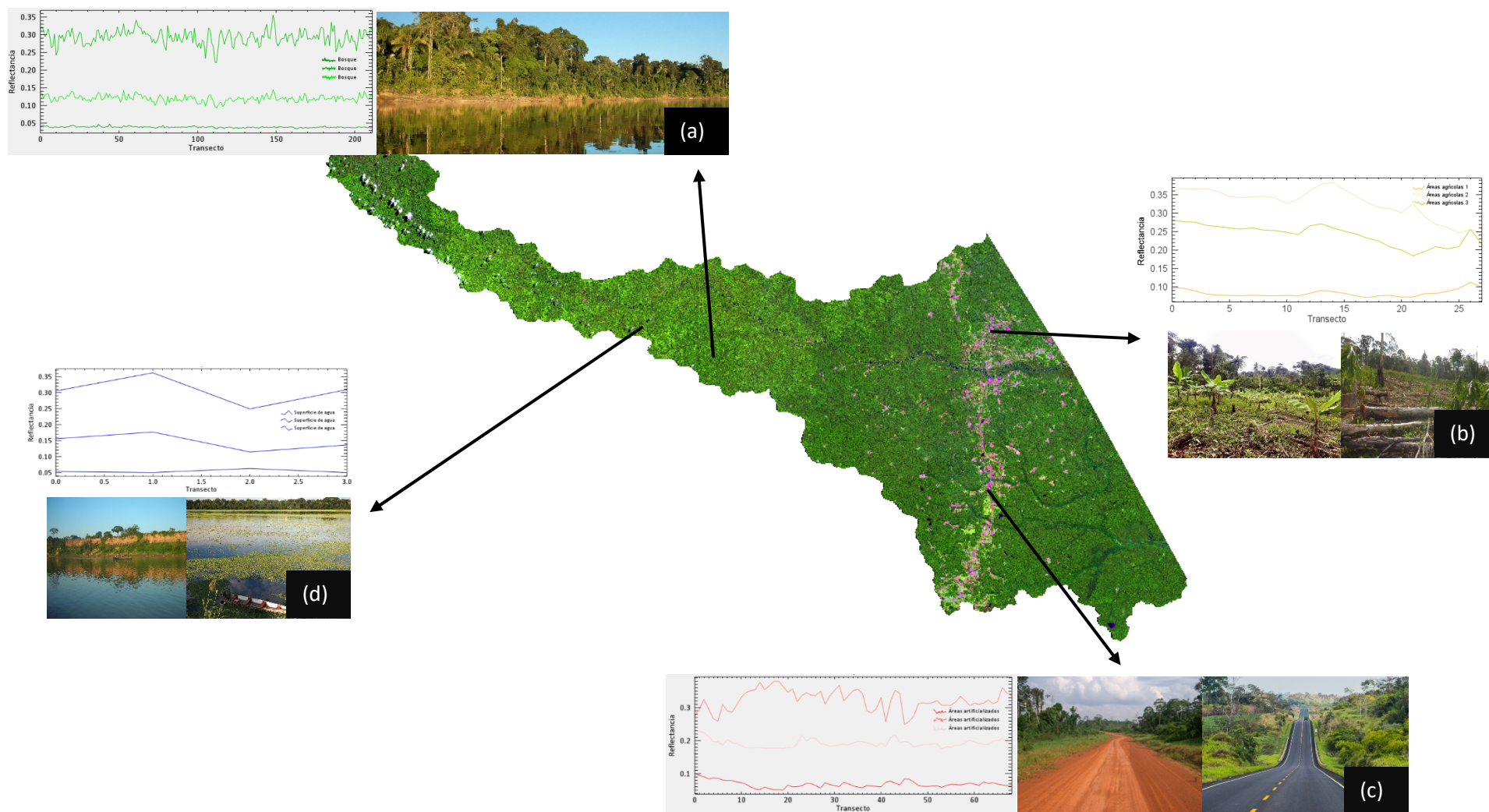


Figure S1. Landsat satellite image, spectral signatures in 2020 R (6) G (5) B (4) bands; (a) Forest and mostly natural areas, (b) Agricultural areas, (c) Artificialized areas, and (d) Water surface.

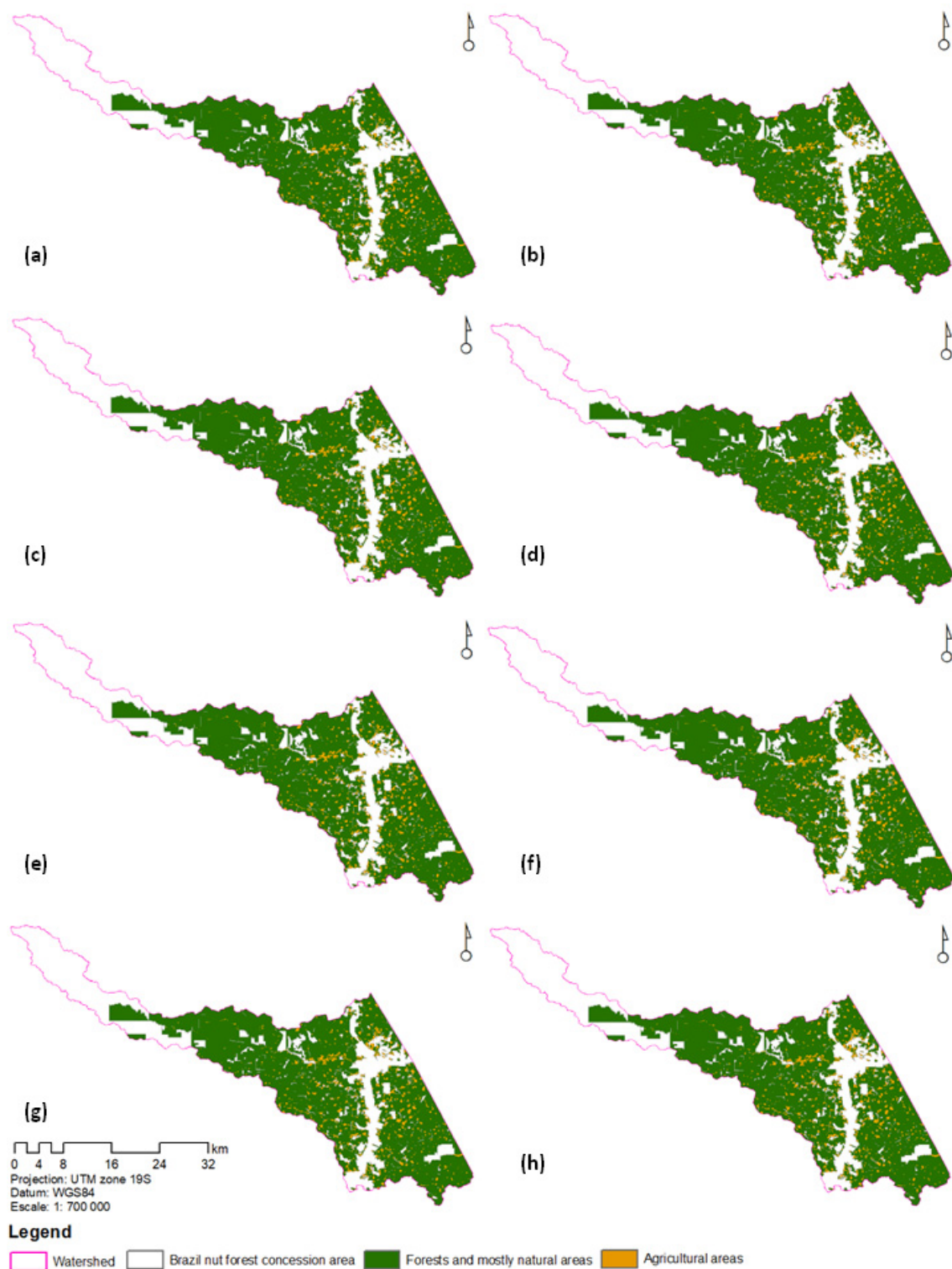


Figure S2. Land use in Brazil nut forest concessions in the Manuripe River micro-basin - Madre de Dios, for the years 2004 (a), 2005 (b), 2006 (c), 2007 (d), 2008 (e), 2009 (f), 2010 (g) and 2011 (h).

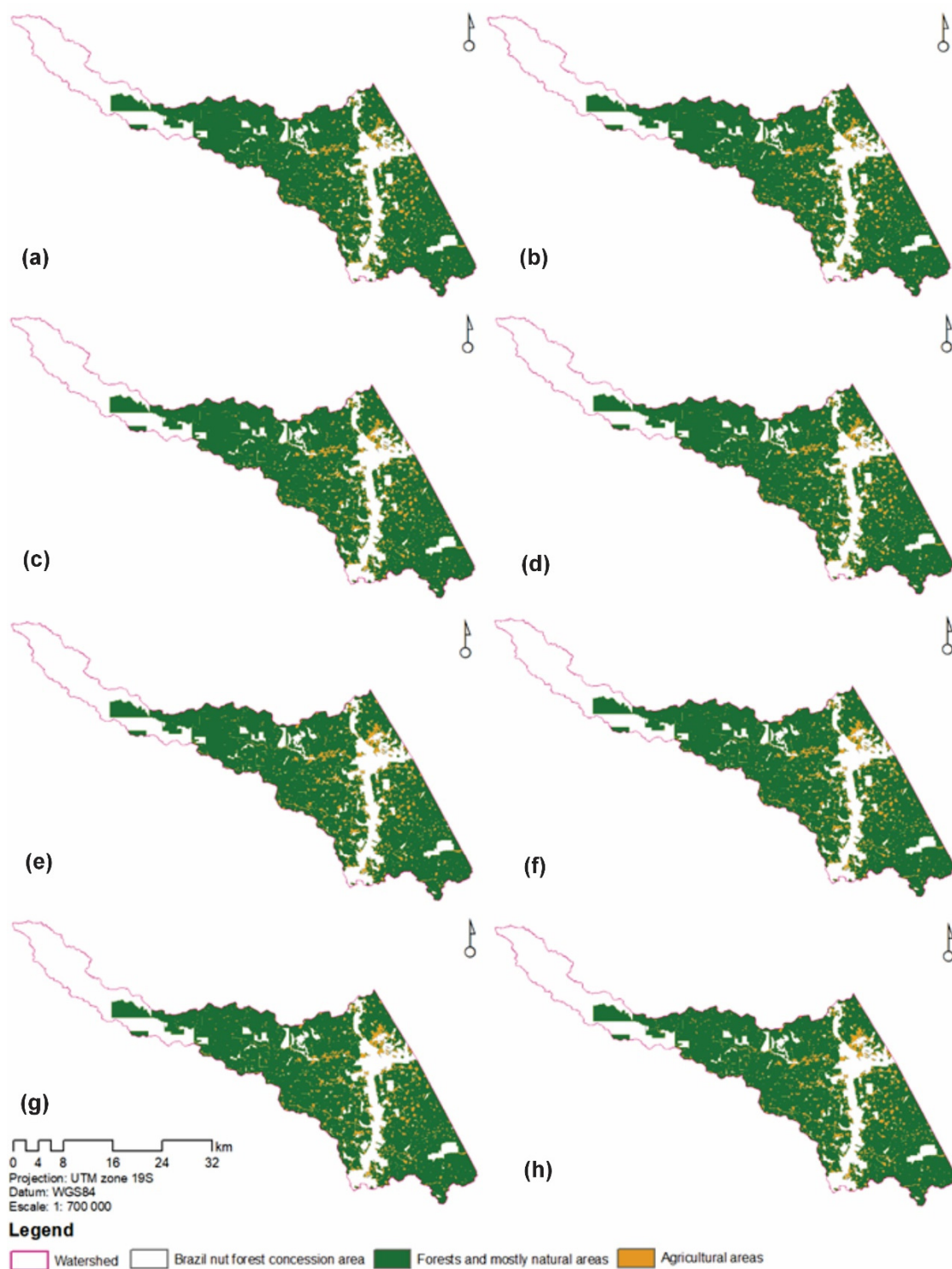


Figure S3. Land use in Brazil nut forest concessions in the Manuripe River micro-basin - Madre de Dios, from the years 2012 (a), 2013 (b), 2014 (c), 2015 (d), 2016 (e), 2017 (f), 2018 (g), and 2019 (h).

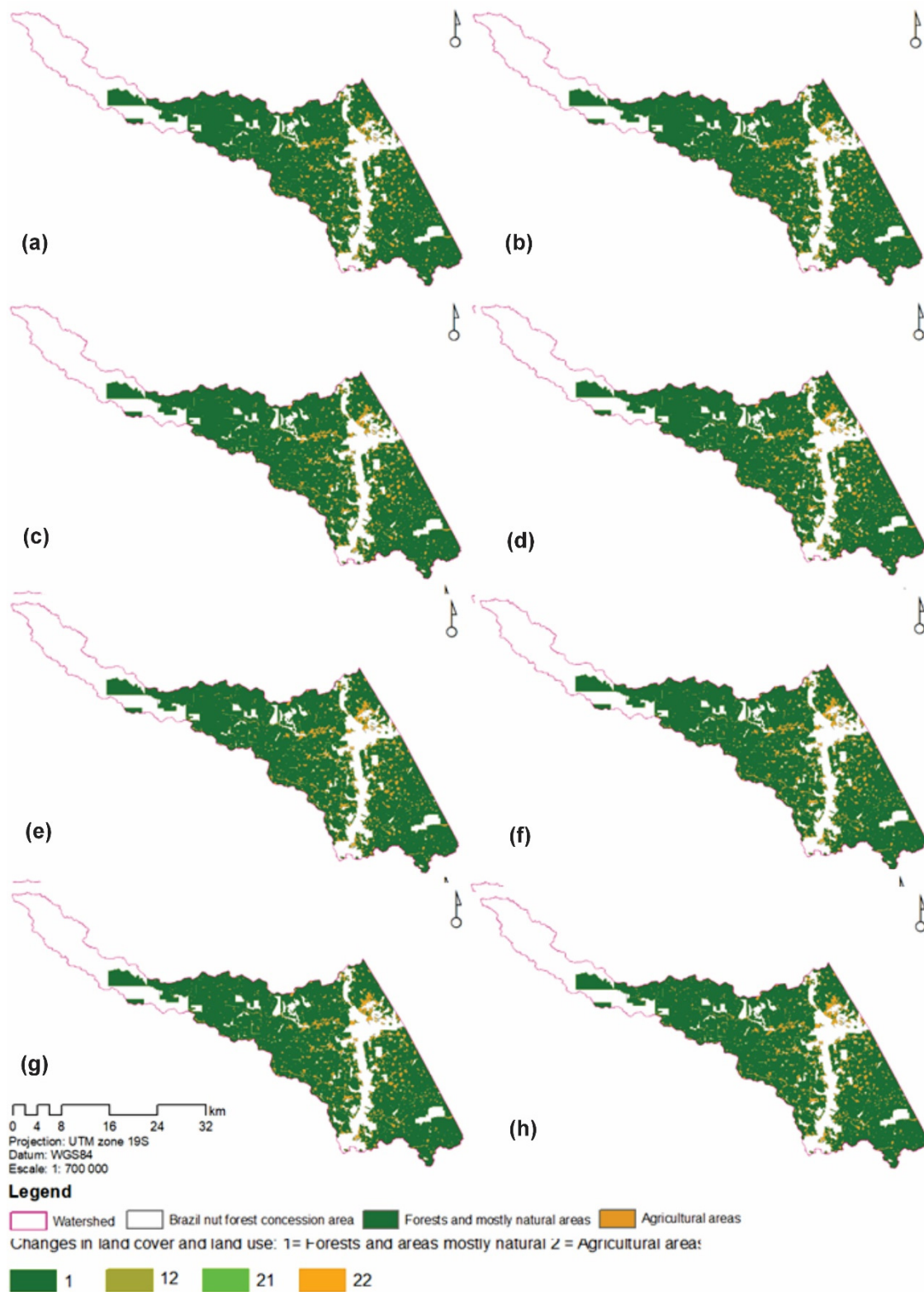


Figure S4. Change in land cover and land use in Brazil nut forest concessions in the Manuripe - Madre de Dios River micro-watershed, for the years 2004-2005 (a), 2005-2006 (b), 2006-2007 (c), 2007-2008 (d), 2008-2009 (e), 2009-2010 (f), 2010-2011 (g), and 2011-2012 (h).

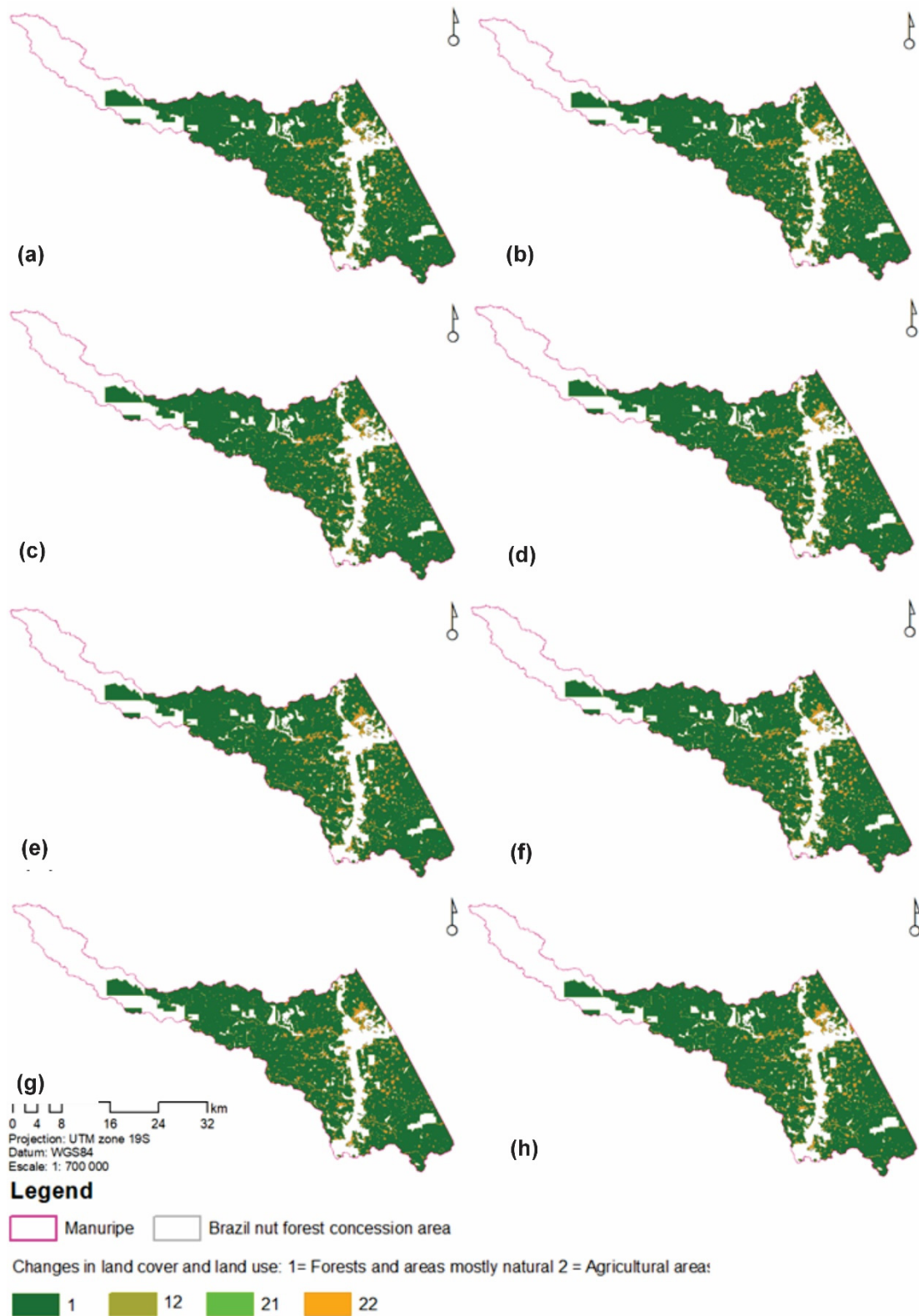


Figure S5. Change in land cover and land use in Brazil nut forest concessions in the Manuripe River micro-watershed - Madre de Dios, for the years 2012-2013 (a), 2013-2014 (b), 2014-2015 (c), 2015-2016 (d), 2016-2017 (e), 2017-2018 (f), 2018-2019 (g), and 2019-2020 (h).