



# Assessing Food Security and Development Opportunities in Southern Sudan

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# Introduction

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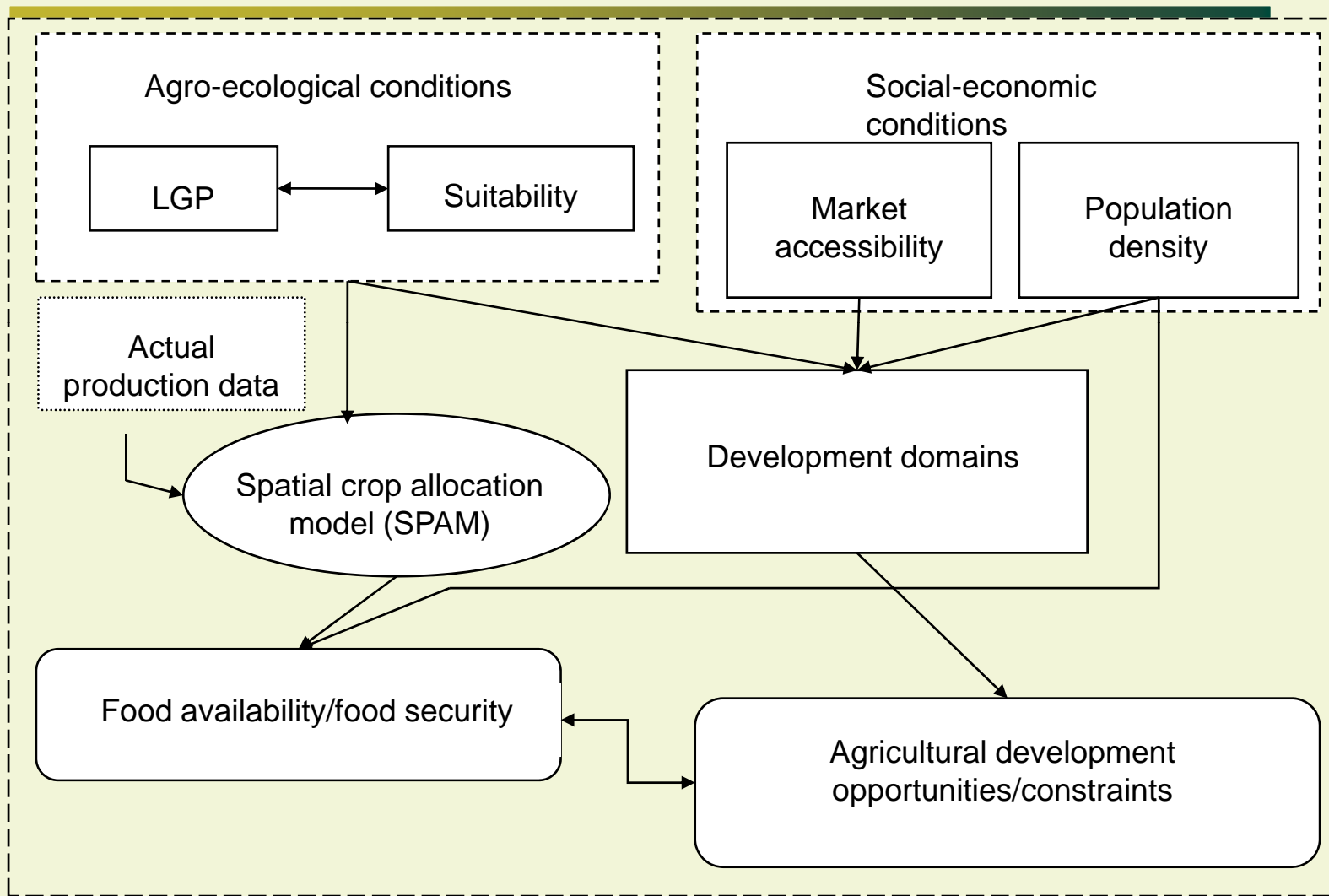


Southern Sudan has the size of the state of Texas, USA

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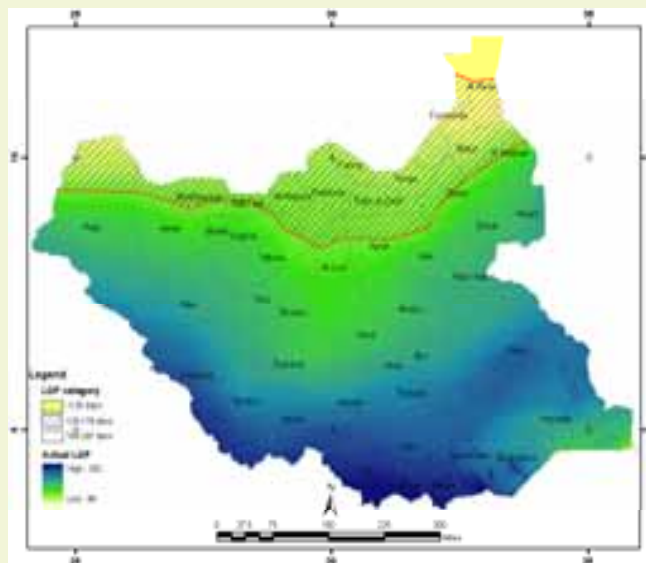


# Components of the Study



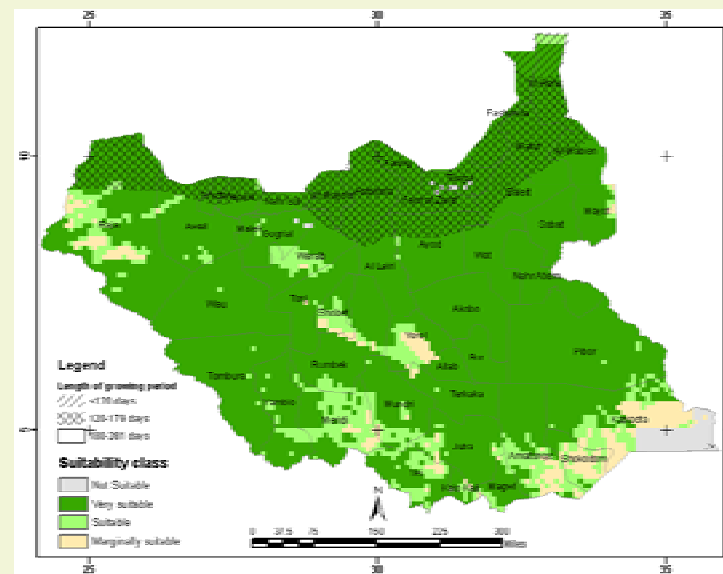


# Agro-Ecological Condition



Length of Growing Period  
(LGP)

(Source: Fred Nachtergaele, FAO)



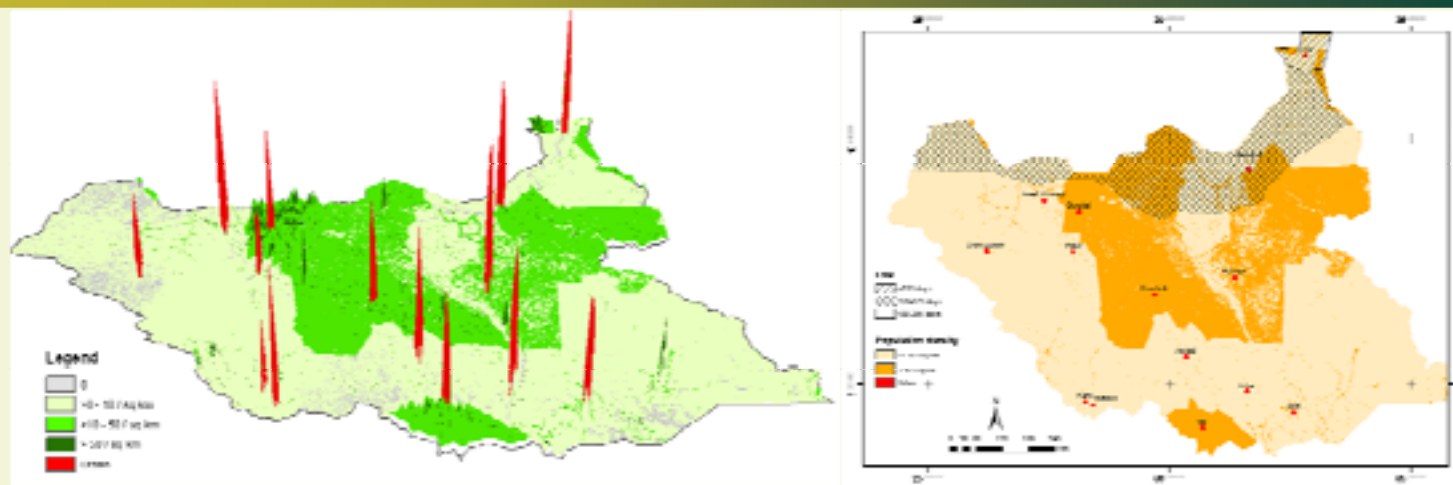
Crop Suitability Map

(Source: FAO-IIASA Database)

LGP and crop suitability maps are spatial indicators of agricultural productivity

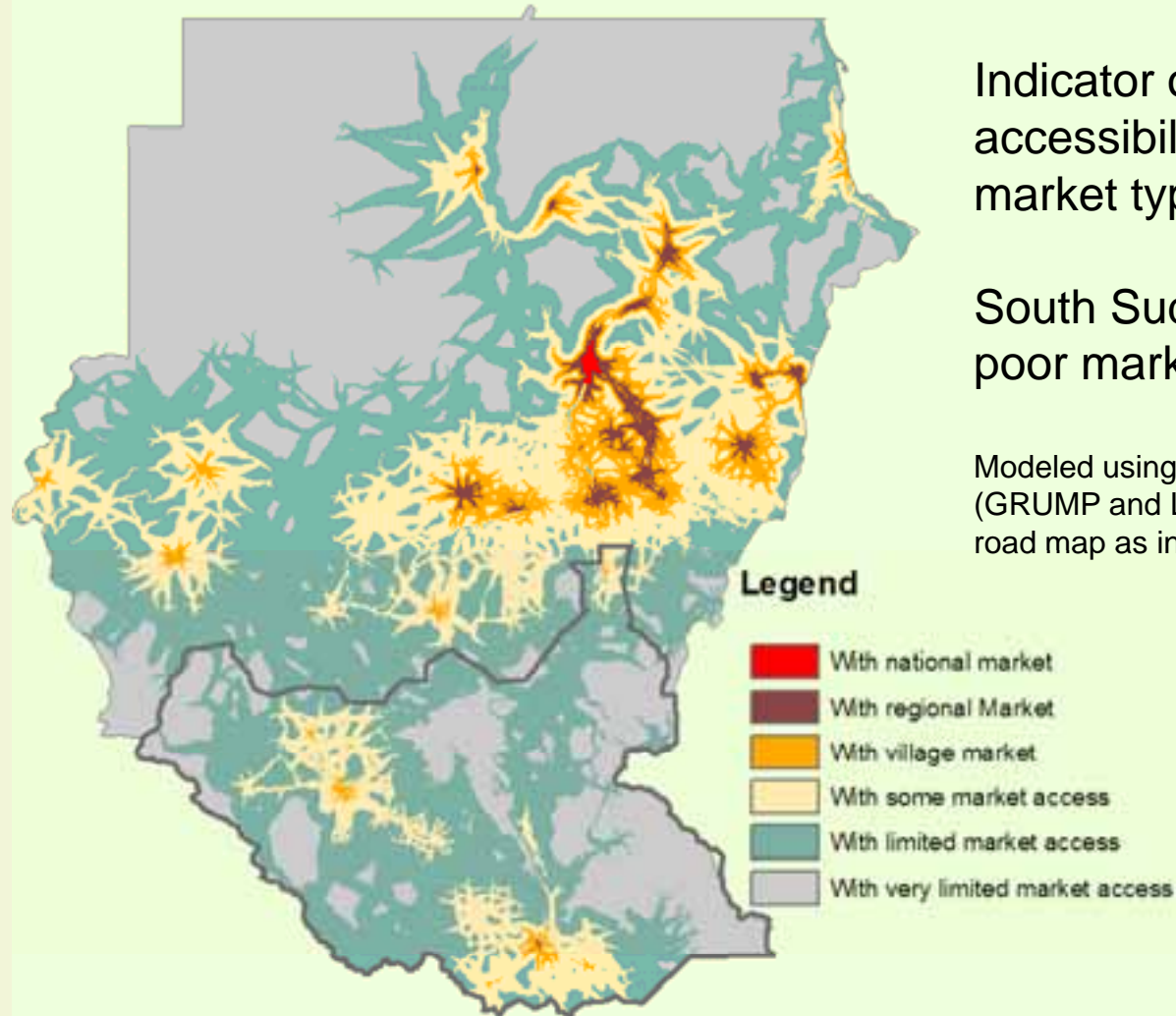


# Population Density and Agr'l Potential



	Share in rural total population (%)			Total
	Low agricultural potential	Medium agricultural potential	High agricultural potential	
Low population density	0.3	4.0	19.7	24.1
Medium-high population density	1.0	14.6	60.4	75.9
<b>Total</b>	<b>1.3</b>	<b>18.6</b>	<b>80.1</b>	<b>100.0</b>
Share in country total area (%)				
Low population density	0.9	11.9	56.2	69.0
Medium-high population density	0.3	6.5	24.2	31.0
<b>Total</b>	<b>1.2</b>	<b>18.4</b>	<b>80.4</b>	<b>100.0</b>
Population density (person/km <sup>2</sup> )				
Low population density	3.0	2.8	2.9	2.9
Medium-high population density	28.5	18.4	20.5	20.2
<b>Total</b>	<b>9.2</b>	<b>8.3</b>	<b>8.2</b>	<b>8.2</b>

# Market Access



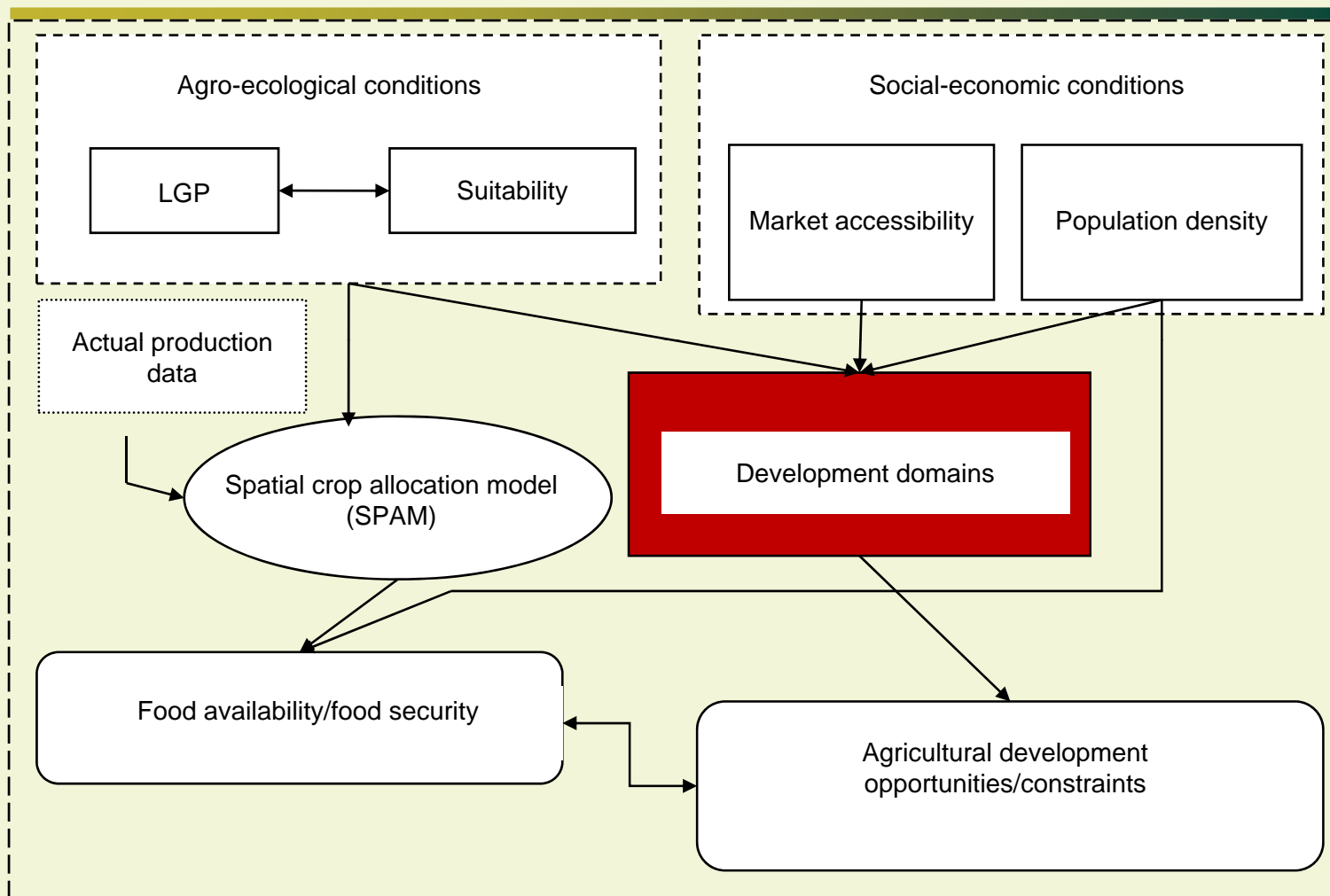
Indicator of accessibility to different market types

South Sudan has very poor market access

Modeled using population map (GRUMP and Landscan 2000) and road map as inputs

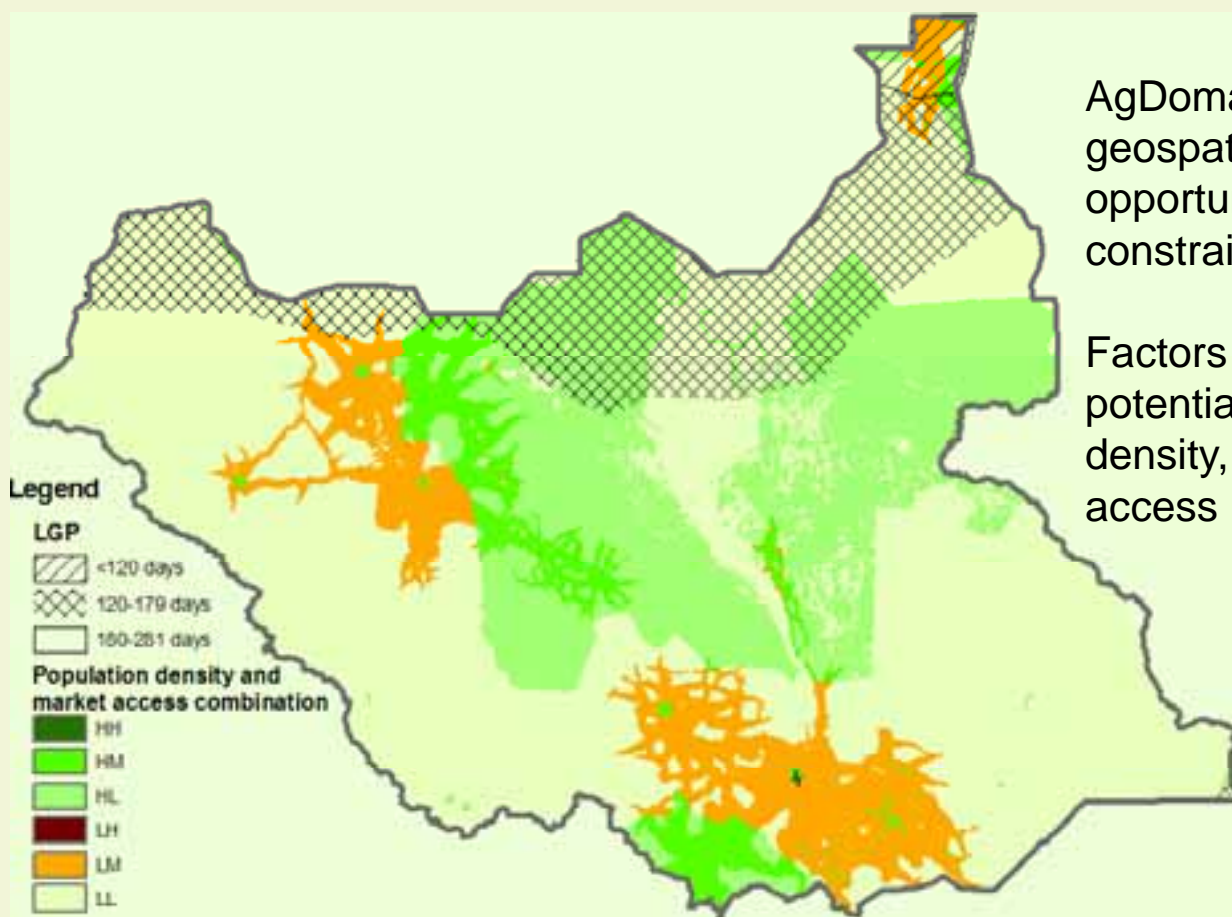


# Overview





# Agricultural Development Domain



AgDomain is a geospatial indicator of opportunities and constraints

Factors are agricultural potential, population density, and market access

H=High, M=Medium, L=Low

First letter is population density, and second is market access



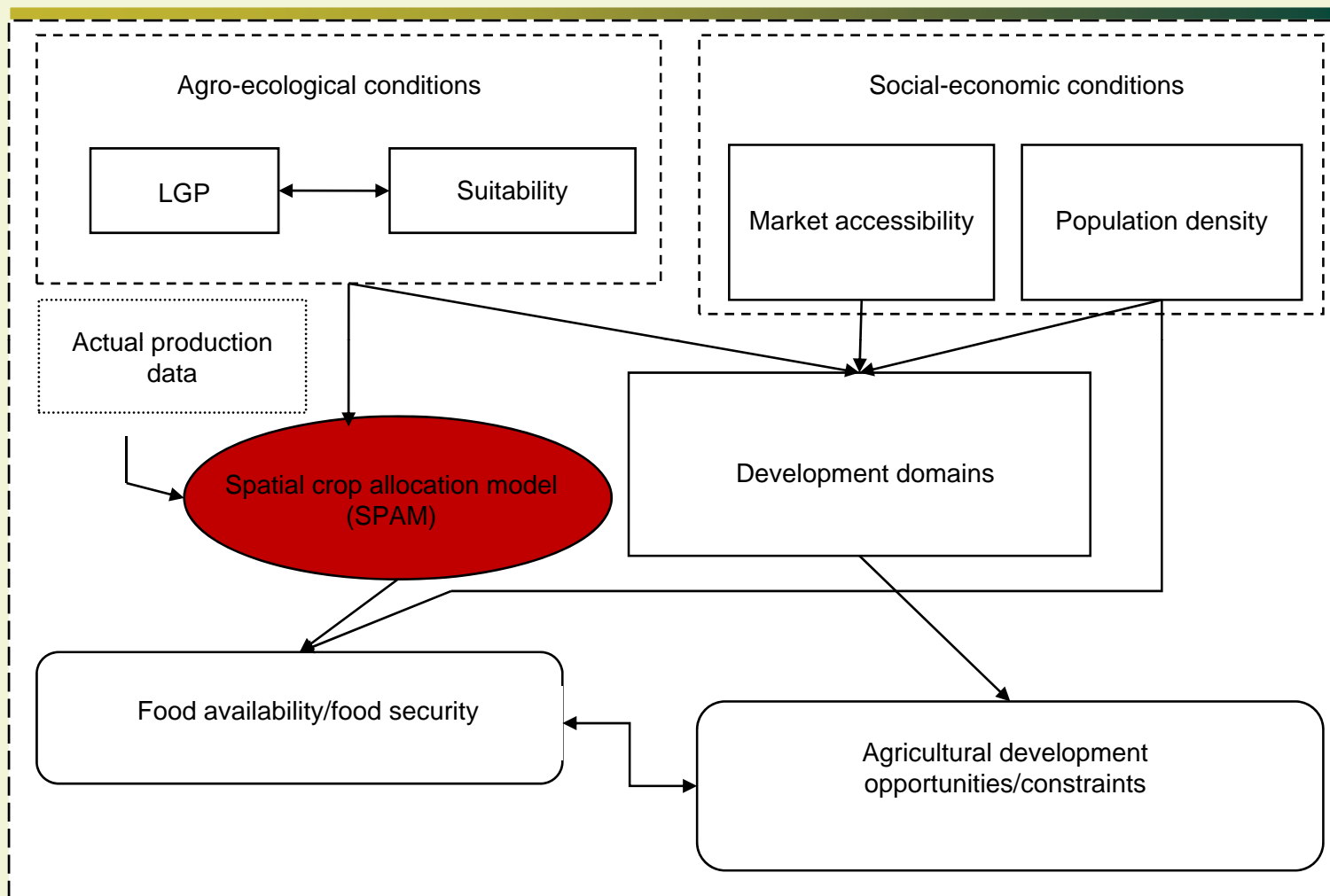


## Population, Land, and Cropland by Development Domain

Agricultural potential	Population density	Market access conditions			Total
		Good	Medium	Poor	
<i>Part A. Population distribution</i>					
Medium	Low	0.1	0.8	2.8	3.7
	Medium/high	0.5	3.8	8.8	13.1
High	Low	0.5	4.1	12.0	16.6
	Medium/high	3.9	23.3	23.8	50.9
Rural total		5.0	32.0	47.3	84.3
Urban		15.7			15.7
Total		20.7	32.0	47.3	100.0
<i>Part B. Area</i>					
Medium	Low	0.2	2.6	9.9	12.7
	Medium/high	0.2	1.6	5.1	6.8
High	Low	1.4	13.4	41.2	56.0
	Medium/high	0.9	8.7	14.6	24.2
Rural total		2.6	26.3	70.8	99.7
Urban		0.3			0.3
Total		2.9	26.3	70.8	100.0
<i>Part C. Crop land</i>					
Medium	Low	0.2	4.4	5.1	9.7
	Medium/high	0.2	1.6	4.9	6.8
High	Low	1.4	13.9	34.4	49.7
	Medium/high	1.3	13.2	19.3	33.7
Total		3.2	33.1	63.8	100.0

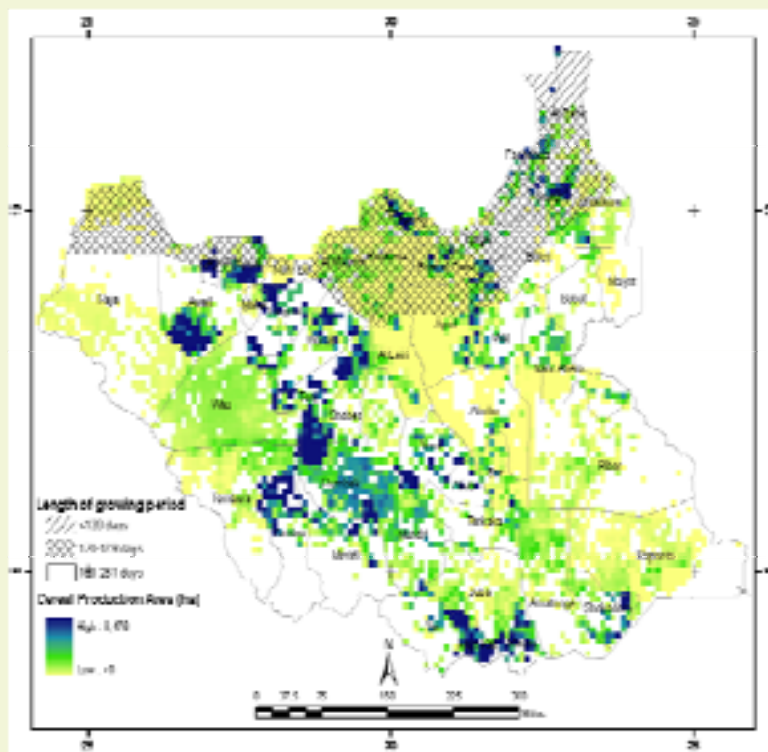


# Overview

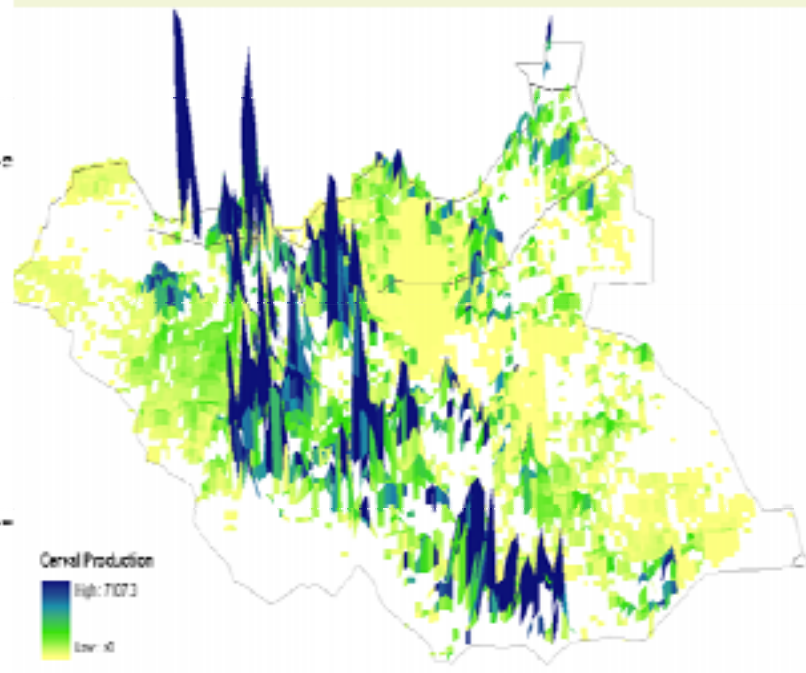




# Agricultural Production



All crops production



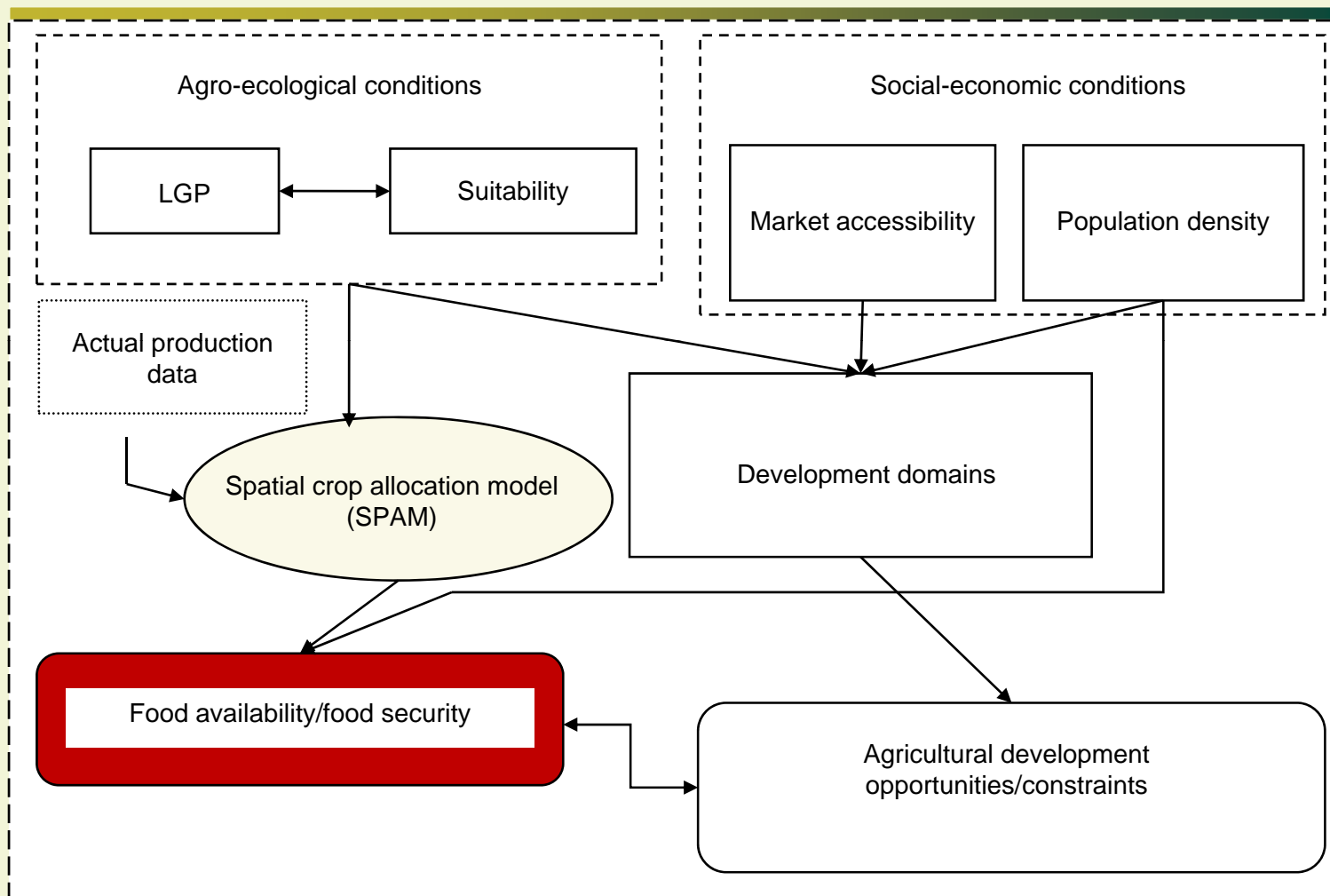
Cereal production

SPAM database is an estimator of crop distribution, area covered/crop, and crop yield

Source: IFPRI's SPAM Dataset



# Overview





# Spatial Assessment of Food Security

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Combined the spatial data came up with:

- Food availability and distribution
  - Yield and per capita harvest
  - Population distribution and food availability
  - Crop production and food availability
  - Population distribution and food security group
  - Crop production across food security groups
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# Food availability at district level

	Number of districts	Harvested area		Production		Population		Surplus(+)/deficit(-)	
		ha	% of total	Mt	% of total	No.	% of total	mt	% of total deficit or surplus
Total	59	1,001,641		1,252,230		9,693,562		+48,581	
<i>By ratio to national pc average*</i>									
<0.50	14	123,252	12.3	103,524	8.3	2,026,137	20.9	-115,120	64.1
0.50-0.75	13	181,685	18.1	165,219	13.2	2,143,317	22.1	-55,162	30.7
0.75-1.00	13	129,622	12.9	145,389	11.6	1,302,758	13.4	-9,269	5.2
1.00-1.25	9	238,741	23.8	300,717	24.0	2,047,738	21.1	+30,397	13.3
>1.25	10	328,341	32.8	537,381	42.9	2,173,612	22.4	+197,735	86.7

South Sudan have 48,581 surplus production  
but most districts have high deficit  
which can import from other districts if market access is good



## Population distribution by food availability groups

Ratio to national average=1,355 kcal/pc/day	Population (% in national total)			Calorie availability		
	Total	Rural	Urban	kcal, pc/day	ratio to national average	share of cereal in total kcal (%)
National average				1,355		
no crop production	22.9	23.5	20.1			
<i>By ratio to national pc average</i>						
0 - 0.25	33.2	22.6	79.2	70	0.1	89.2
0.25 - 0.75	13.4	16.4	0.4	614	0.5	87.4
0.75 - 1.00	5.5	6.8	0.0	1,165	0.9	90.1
1.00 - 1.5	6.6	8.0	0.2	1,621	1.2	88.7
1.50 - 2.00	4.6	5.7	0.0	2,316	1.7	91.6
2.00 - 4.00	8.6	10.6	0.0	3,645	2.7	94.4
>4.00	5.2	6.4	0.0	12,687	9.4	96.1

20% of populated areas don't produce crops  
 33% of population live in areas with 75%  
 below national average food availability



## Crop production across food availability groups

Ratio to national average=1,355 kcal/pc/day	Production			Area		Cereal yield (mt/ha)
	share in national total (%)	per capita (kg)	share of cereal in total production (%)	share in national total (%)	per capita (ha)	
National average		417			0.2	1.20
0 - 0.25	1.1	13	58.9	1.9	0.0	1.05
0.25 - 0.75	4.7	147	46.3	7.5	0.1	0.99
0.75 - 1.00	4.9	369	36.1	5.9	0.2	0.94
1.00 - 1.50	9.1	576	31.7	10.7	0.3	0.86
1.50 - 2.00	7.0	637	42.3	9.4	0.4	1.02
2.00 - 4.00	26.7	1,293	33.8	24.5	0.5	1.13
>4.00	46.5	3,737	41.4	40.1	1.4	1.44

Table shows reason for unequal distribution of food availability





## Population distribution across food security group

Ratio to 2,100	Population (% in national total)			Calorie availability ratio to 2,100 kcal kcal, pc/day	share of cereal in total kcal (%)	
	Total	Rural	Urban			
National average				1,355	0.6	93.8
no crop production	22.9	23.5	20.1			
<i>By ratio to 2,100 kcal/pc/day</i>						
0 - 0.25	38.0	28.4	79.6	117	0.1	87.9
0.25 - 0.75	17.1	21.0	0.0	986	0.7	89.4
0.75 - 1.00	4.1	5.0	0.2	1,789	1.3	87.6
1.00 - 1.50	7.1	8.8	0.0	2,620	1.9	93.6
1.50 - 2.00	3.6	4.4	0.0	3,528	2.6	93.6
2.00 - 4.00	4.5	5.5	0.0	5,859	4.3	94.7
>4.00	2.8	3.4	0.0	17,899	13.2	96.5

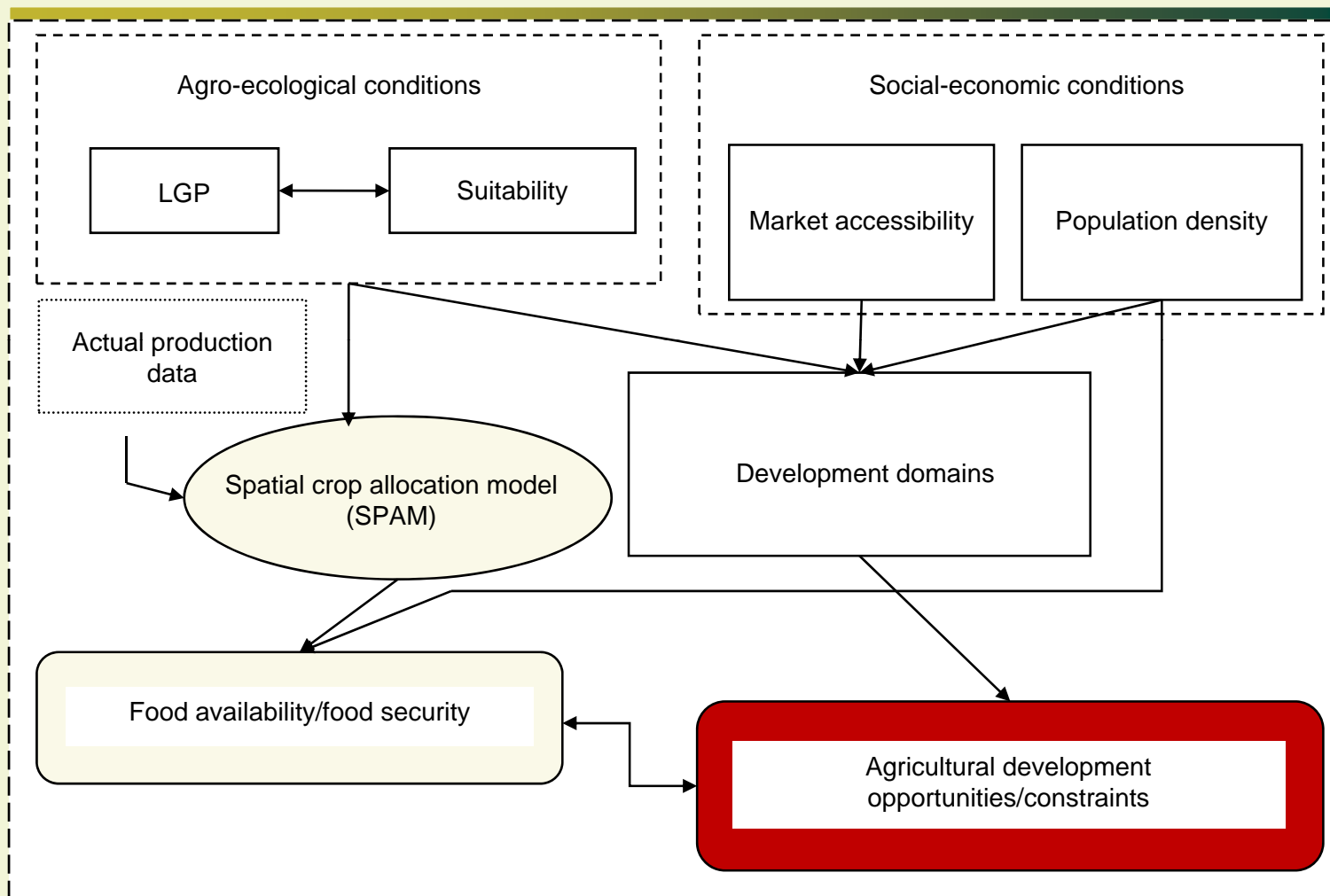


## Crop production across food security groups

Ratio to 2,100	Production			Area		Cereal yield (mt/ha)
	share in national total (%)	per capita (kg)	share of cereal in total production (%)	share in national total (%)	per capita (ha)	
National average		417			0.2	1.20
<i>By ratio to 2,100 kcal/pc/day</i>						
0 - 0.25	2.2	24	54.7	3.8	0.0	1.03
0.25 - 0.75	12.1	294	38.1	15.9	0.2	0.91
0.75 - 1.00	6.0	613	32.5	7.3	0.3	0.92
1.00 - 1.50	12.7	740	42.1	15.1	0.4	1.08
1.50 - 2.00	8.3	967	43.4	10.1	0.5	1.12
2.00 - 4.00	27.7	2,579	27.3	20.0	0.8	1.20
>4.00	31.1	4,704	46.7	28.0	1.9	1.52



# Overview





# Population distribution by food security categories and development domains

Agricultural potential	Market access condition	Population density	Food extremely insecure (kcal/pc/day≤1,470)		Food insecure (kcal/pc/day≤2,100)		Food secure (kcal/pc/day>2,100)	
			% of total population	% of rural population	% of total population	% of rural population	% of total population	% of rural population
			n	n	n	n	n	n
Medium	Poor	Low	1.5	1.9	0.0	0.0	0.4	0.5
		High	8.7	10.5	0.4	0.5	1.7	2.1
	Medium	Low	0.3	0.4	0.0	0.0	0.1	0.1
		High	2.9	3.4	0.7	0.8	1.2	1.5
	Good	Low	0.2	0.3	0.0	0.0	0.2	0.2
		High	3.5	0.9	0.0	0.0	0.0	0.1
High	Poor	Low	5.1	6.3	0.5	0.6	3.6	4.5
		High	22.7	25.2	1.8	2.2	5.5	6.8
	Medium	Low	1.8	2.2	0.3	0.3	1.0	1.2
		High	16.0	18.4	1.0	1.3	4.1	5.1
	Good	Low	0.1	0.1	0.0	0.0	0.0	0.0
		High	14.3	2.4	0.1	0.0	0.1	0.1
Total			77.2	72.0	4.8	5.9	17.9	22.1

Most food secure areas have no good access to market



## Crop area distribution by food security categories and development domains

Agricultural potential	Market access condition	Population density	Food extremely insecure (kcal/pc/day≤1,470)			Food insecure (kcal/pc/day≤2,100)			Food secure (kcal/pc/day>2,100)			
			Area (ha)	% of national total	Area per rural population (ha)	Area (ha)	% of national total	Area per rural population (ha)	Area (ha)	% of national total	Area per rural population (ha)	
Medium	Poor	Low	3,761	0.2	0.03	1,019	0.1	0.40	48,628	2.9	1.44	
		High	50,163	3.0	0.07	14,156	0.8	0.38	77,056	4.6	0.50	
	Medium	Low	835	0.0	0.03	673	0.0	0.33	12,333	0.7	2.10	
		High	13,866	0.8	0.06	18,941	1.1	0.32	46,381	2.8	0.42	
	Good	Low	75	0.0	0.00	0	0.0	0.00	4,797	0.3	0.30	
		High	849	0.1	0.01	0	0.0	0.00	1,265	0.1	0.30	
High	Poor	Low	25,116	1.5	0.05	19,427	1.2	0.41	336,959	20.1	1.04	
		High	106,051	6.3	0.06	50,977	3.0	0.31	343,895	20.5	0.70	
	Medium	Low	9,186	0.5	0.06	8,594	0.5	0.36	108,259	6.5	1.20	
		High	91,607	5.5	0.07	26,260	1.6	0.28	241,621	14.4	0.66	
	Good	Low	86	0.0	0.02	0	0.0	0.00	3,532	0.2	1.51	
		High	8,808	0.5	0.05	696	0.0	0.36	2,486	0.1	0.38	
	Total			310,404	18.5	0.06	140,743	8.4	0.33	1,227,211	73.1	0.76

Low per capita cropland is the major food security constraint  
 70% of cropland are food secure, a surplus indicator  
 40% of croplands have poor market access



# Summary

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- Used publicly available data in projecting agricultural crop production and consumption
  - Food security and distribution
    - Food insecurity is mainly due to under-utilized fertile agricultural lands even in populated areas
    - 70% of districts have per capita cereal availability that are below national average
    - 75% of population consume only  $\frac{3}{4}$  of the supposed daily food calorie intake (2,100 kcal/day)
    - Uneven spatial distribution of food availability – with 13% of rural population live in areas that exceed 50% higher than national average
    - Food surplus areas need access to market to make food production profitable
-