

Global Challenges in Agriculture

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Global Goals for sustainable Development

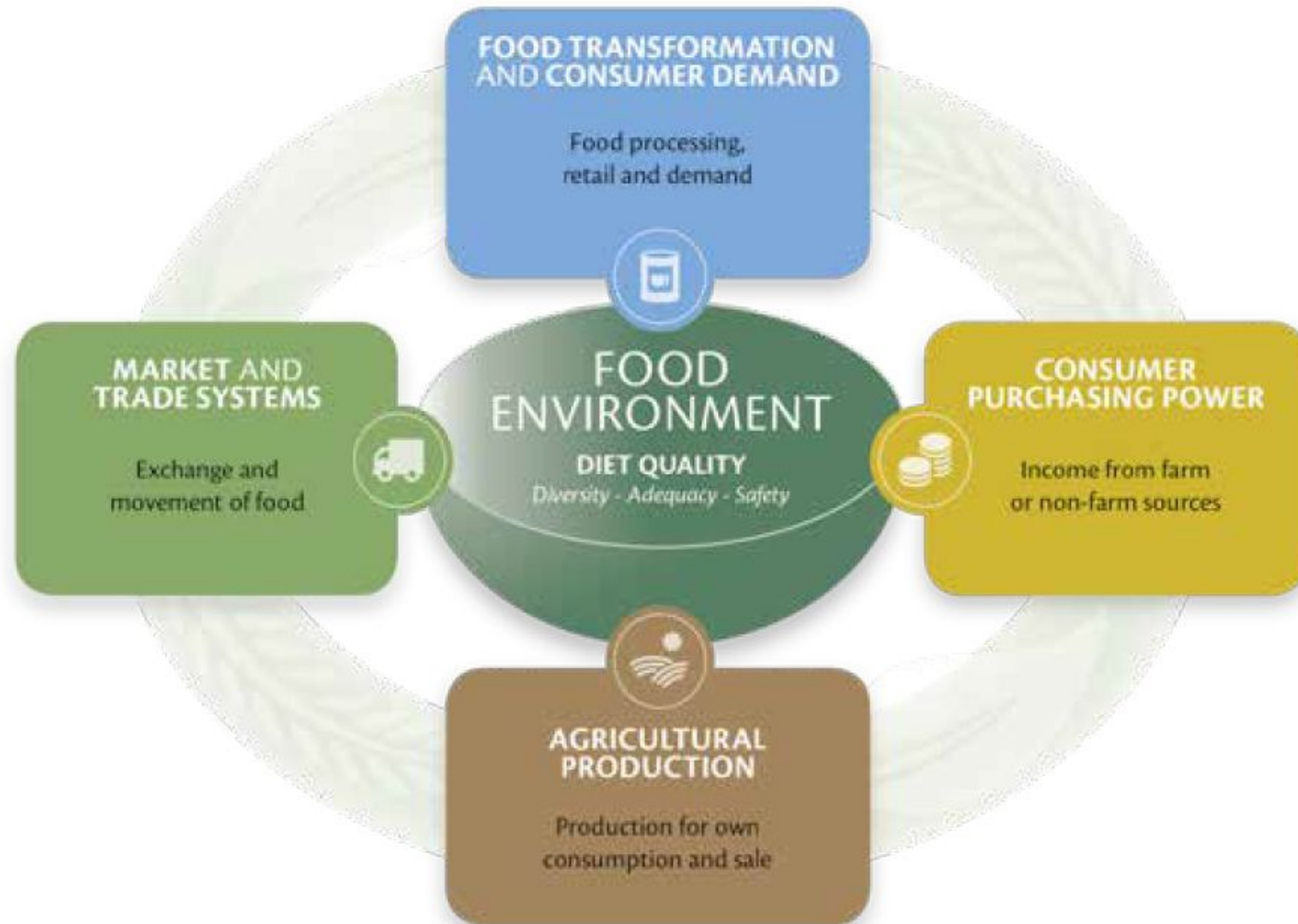
- **1. No Poverty (At global level 40% of labour force is employed in agriculture)**
- **2. Zero Hunger**
- **3. Good health and Well-being**
- **4. Quality education**
- **5. Gender Equality (Women engaged in agriculture)**
- **6. Clean water and Sanitation**
- **7. Affordable and clean energy**
- **8. Decent work and Economic Growth**
- **9. Industry, Innovation and infrastructure**
- **10. Reduced inequalities**

Global Goals for sustainable Development

- **11. Sustainable Cities and communities**
- **12. Responsible consumption and production**
- **13. Climate Action**
- **14. Life below water**
- **15. Life on Land**
- **16. Peace, Justice and strong Institutions**
- **17. Partnerships for the Goals**

- Agriculture is linked to all these goals at supplying end in some cases and at receiving end in some cases.

Conceptual framework of link between diet quality and food system (Global panel on Agriculture and food systems for nutrition)



Food insecurity

Entitlements to food

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graph BT; A[Entitlements to food] --> B[Direct entitlements/production]; A --> C[Indirect entitlements]; C --> D[Income]; C --> E[Food prices]
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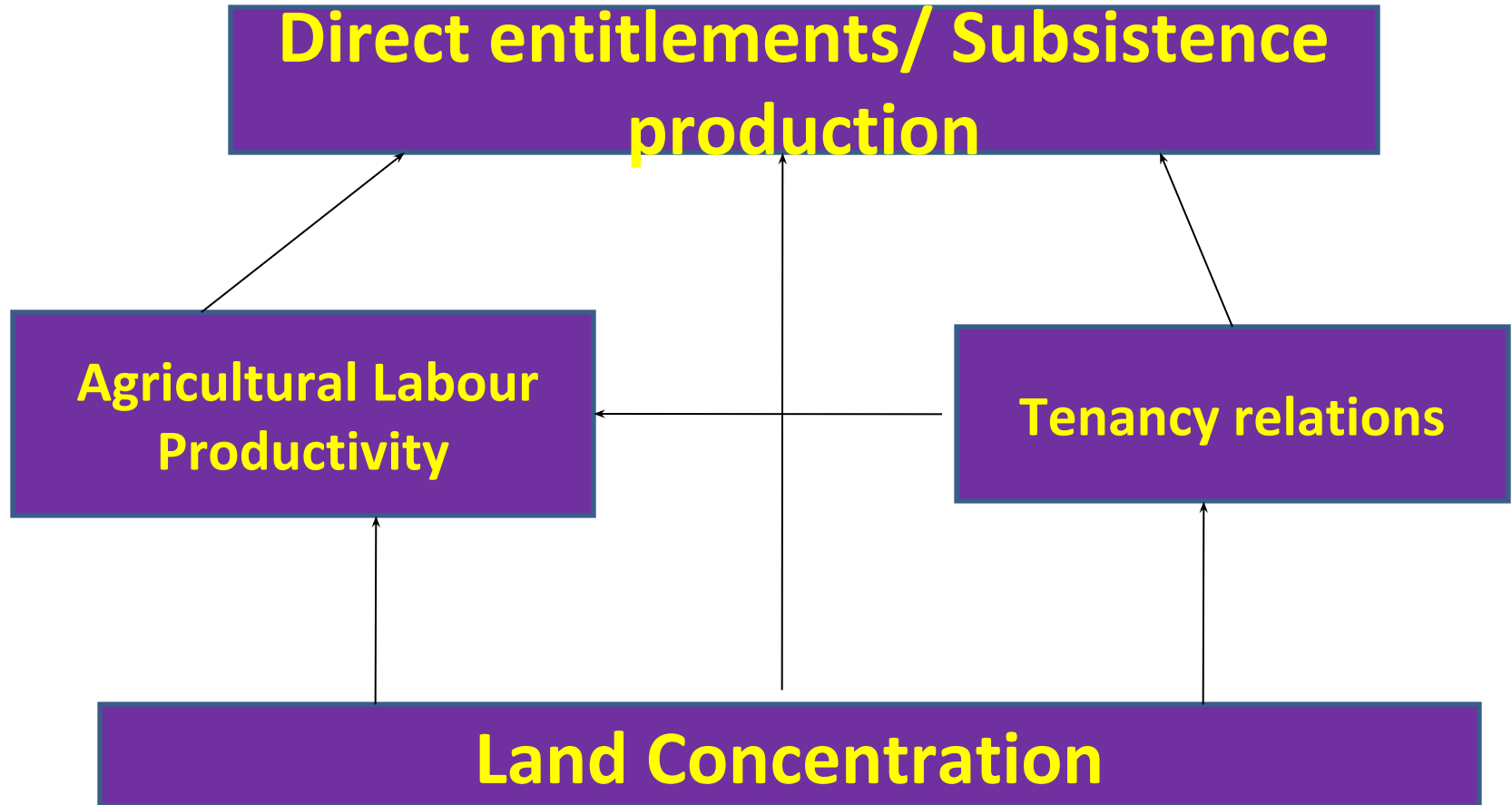
**Direct
entitlements/production**

Indirect entitlements

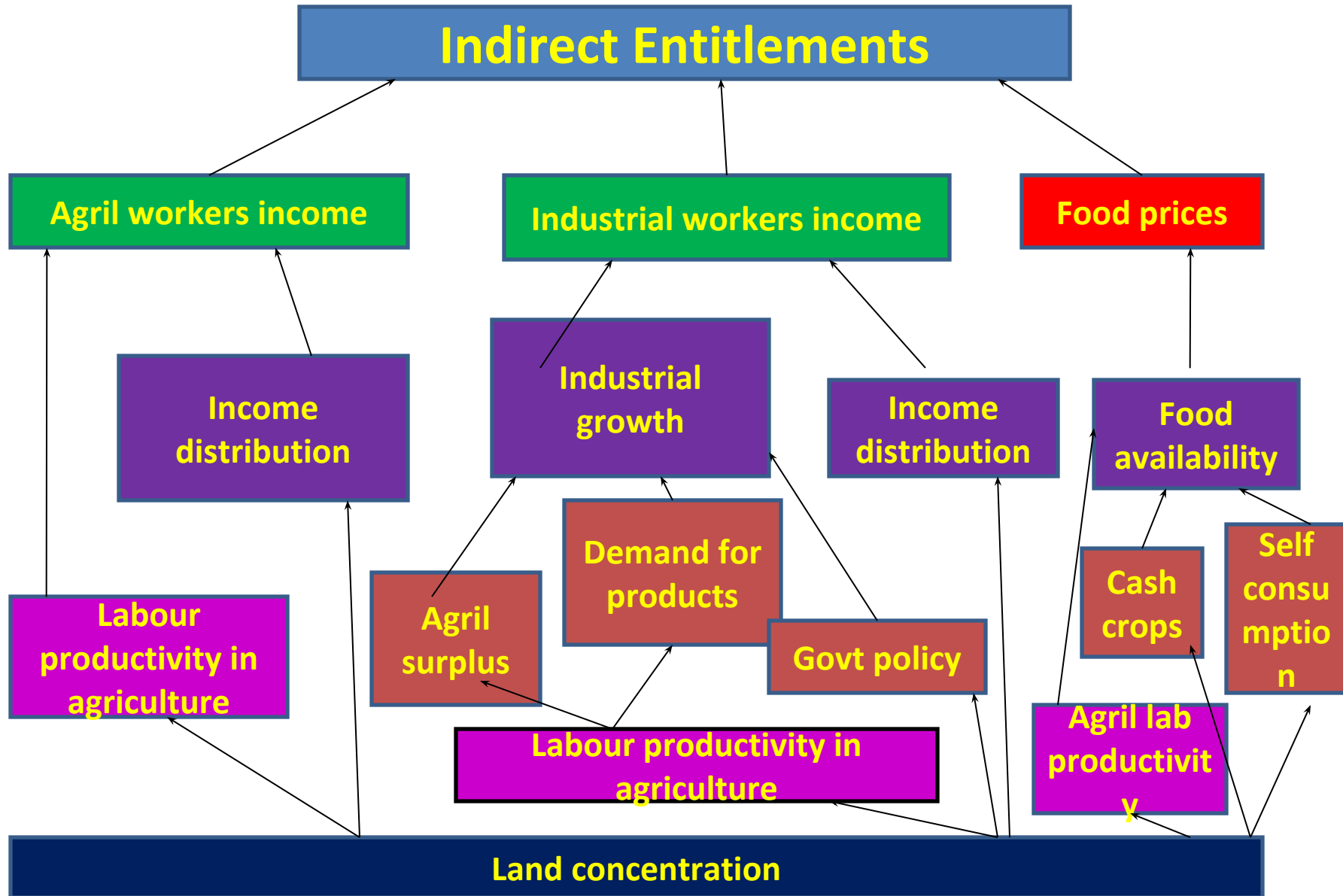
Income

Food prices

Land concentration and direct entitlements



Land concentration and indirect entitlements



Typology

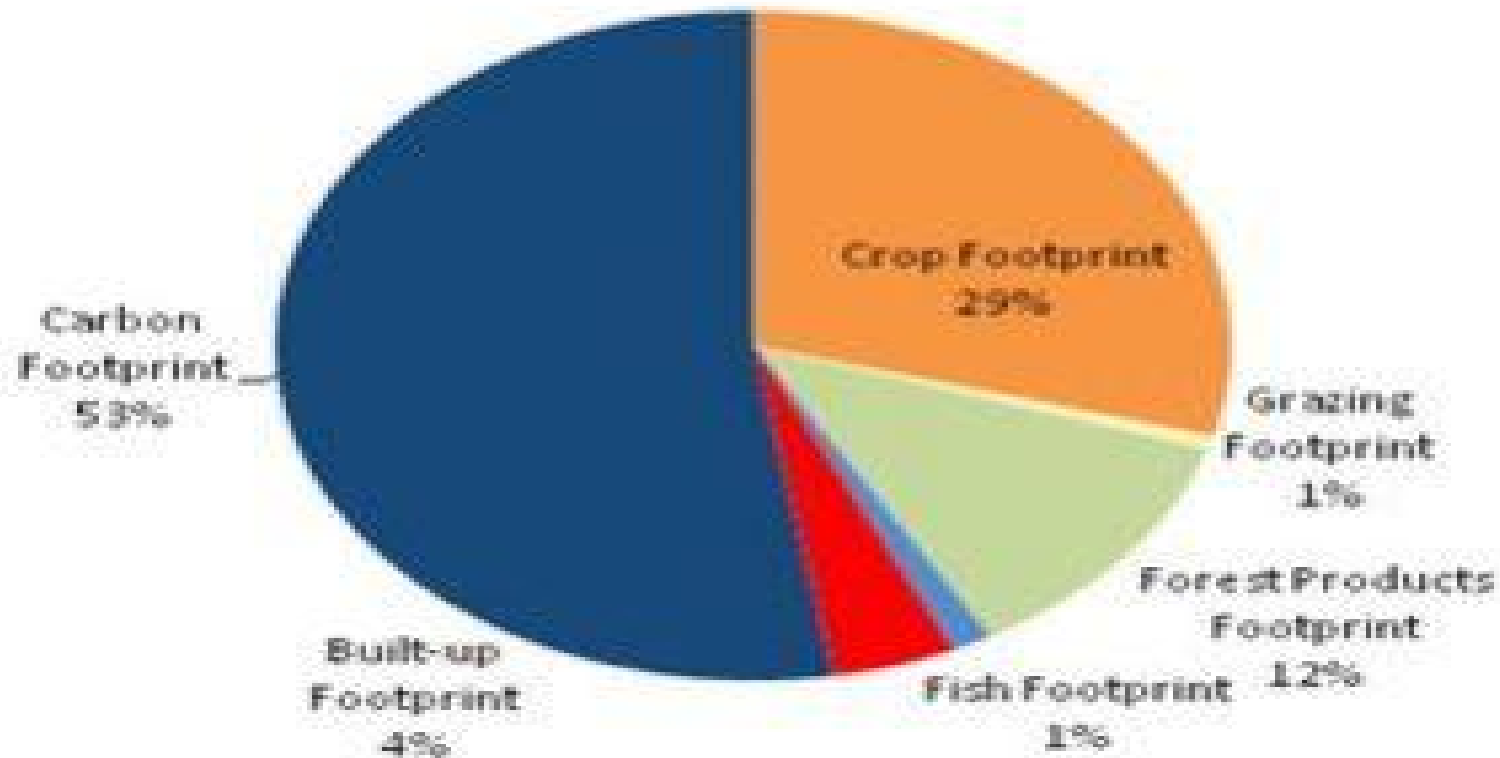
Context	Share of agricultural population	Land concentration	Food availability	Food insecurity	Policy options
1	Low	High	High	No	NA
2	Low	High	Low	Medium	Food availability
3	High	High	High	Medium	Industrialization
4	High	High	Low	High	Land reforms Food availability Industrialization
5	High	Low	Low	Medium-high	Food availability Industrialization
6	High	Low	High	Medium	Industrialization
7	Low	Low	Low	Medium	Food availability
8	Low	Low	High	Medium-low	Increase land concentration

Issue

- **China with just 10% of World's agricultural land, 7% of the world's potable water is feeding almost 20% of world's population (OECD-2017)**
- **India, with just 2.4 per cent of world's area sustains 18 per cent of human, 20 per cent of cattle and buffalo and 12 per cent of sheep and goat population (FAO,2010).**
- **India's ecological foot print is 0.9 global ha/person**
- **India has the third heavier ecological foot print in the world.**
- **Growing multiple needs**
- **Competing demands for land**
- **Localized storms because of imbalance in different resources at country level**
- **Need for planning at all levels.**

Source: www.footprintnetwork.org

India [NFA 2016]



Distribution of agricultural holdings at Global level (source: Lowder et al(2016))

- World- 570 million farms
- 74% in Asia
- 9% in Sub Saharan Africa
- 7% in Europe and Central Asia
- 4 % in Latin America and Caribbean countries

13 % farms are in low income countries

4% of farms are in High income countries

Distribution of agricultural holdings at Global level (source: Lowder et al(2016))

Country	Agricultural Holdings (Million)	Share in World (%)	Rank	Country	Agricultural area(Million ha) (2010)	Share in World (%)
China	201	35	1	China	525	11
India	138	24	2	Australia	456	9
Indonesia	25	4	3	USA	414	8
Russian Federation	23	4	4	Brazil	261	5
Bangladesh	15	3	5	Russian Federation	217	4
World	570			World	4889	

Distribution of agricultural holdings at Global level (source: Lowder et al(2016))

- 84 % of farms are smaller than 2 ha and operate 12% of farm land.
- More than 500 million farms are family farms.
- Family farms operate about 75% of farm land.

Global Challenges in Agriculture

- Food and nutrient sufficiency (self-reliance vs dependence on trade)
- Efficient and responsible use of resources
- Technologies for high productivity of resources
- Respectable income for people dependent on agriculture
- Provision of employment
- Attracting young farmers

Global Challenges in Agriculture

- **Ensuring adequate farm income**
- **Addressing risks**
- **Reversing slow down in farm productivity and supporting innovation**
- **Protecting ecosystem and biodiversity**
- **Mitigating and adapting to climate change**
- **Reducing reliance on chemicals and non-renewable energy inputs**
- **Responding to consumer demand for quality, safe and healthy food**

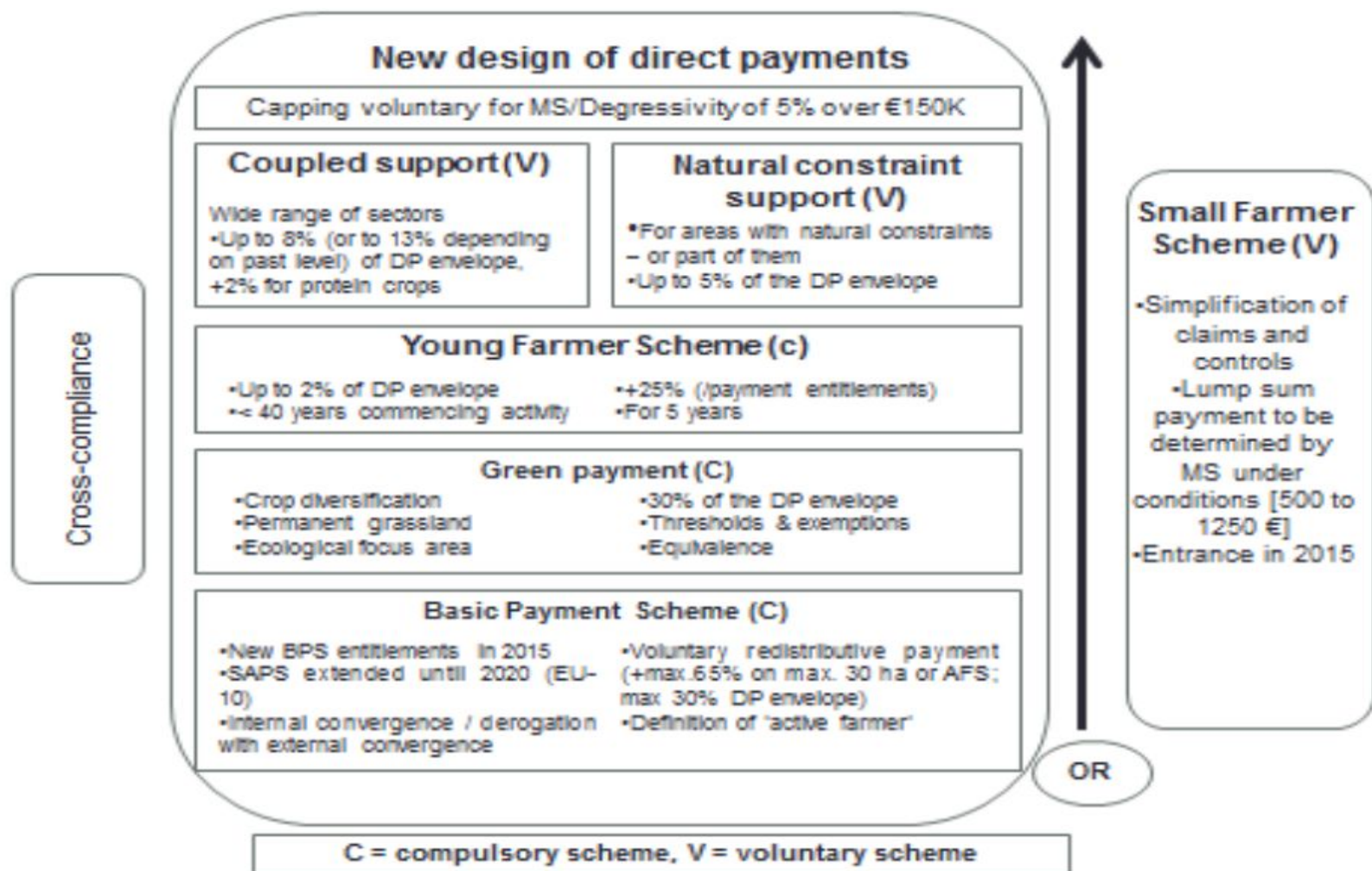
Typology of structural transformation paths

Source: Dorin et al (2013)

		Active Population in Agriculture	
		Increasing	Decreasing
Income differential between agricultural and non-agricultural workers	Narrowing	Farmer developing	Lewis path
	Growing	Lewis trap	Farmer –excluding

Structure of direct payment in EU

source: (COMAGRI)



The current system of direct payments **is neither sustainable in the long run nor designed to address the challenges facing farmers and land managers** in Europe today and in the future.

A recommended structure for the future of direct payments is proposed, based on **the following set of principles.**

Payments should be **targeted on specific objectives** with a clear results orientation.

Payments should be restructured around a one-pillar, programmed, multi-annual CAP.

National co-financing should be required for all CAP expenditure.

Decoupled direct payments should be **gradually phased out over a pre-announced transitional period.**

Savings should be redirected to increasing spending on risk management, competitiveness, climate action and environmental public goods.

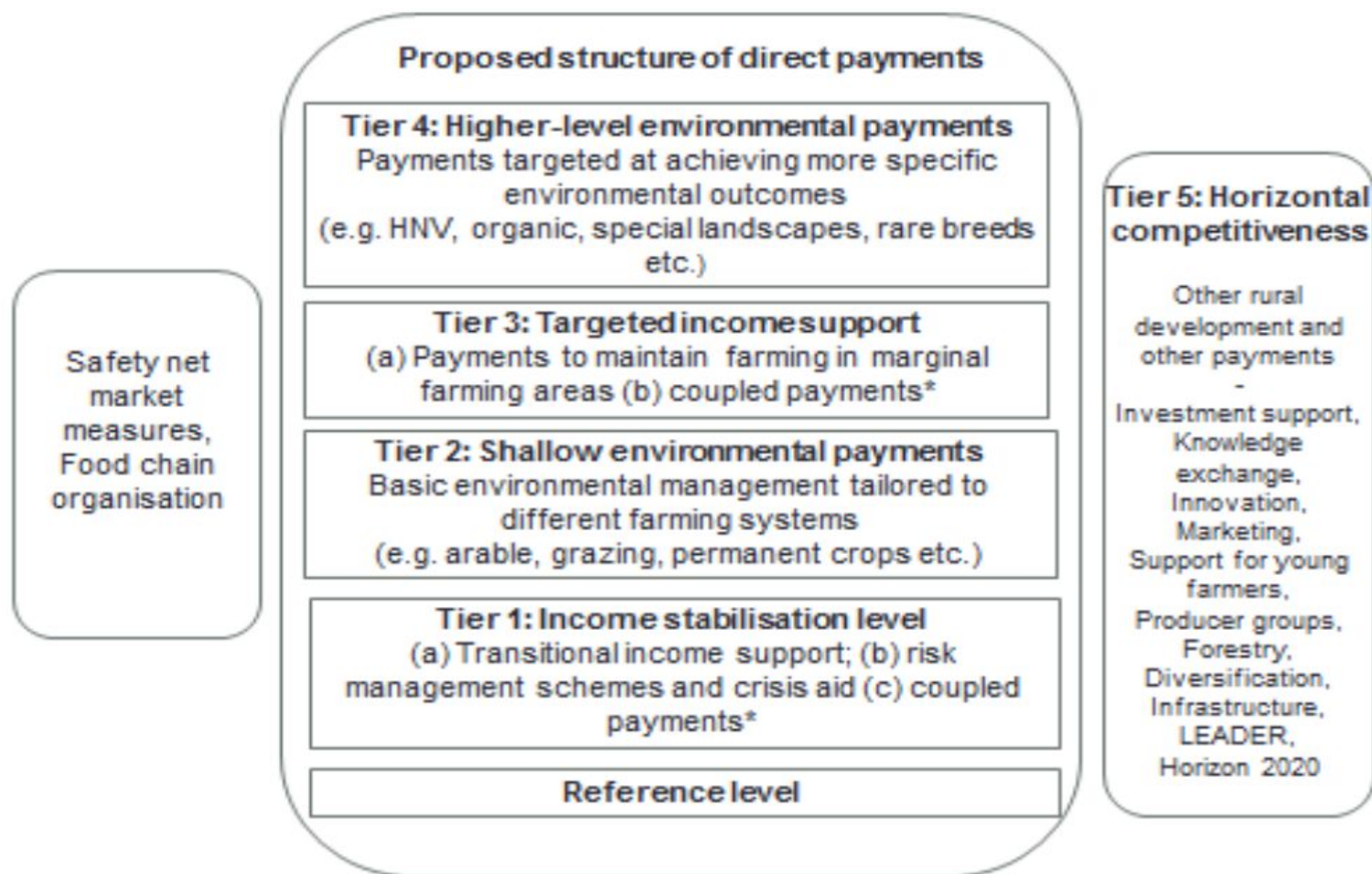
Payment entitlements should be replaced by a contractual framework between farmers and public authorities.

Cross-compliance and the greening payment **should be replaced with 'conditional greening'** whereby the receipt of public support would be conditional on enrolling in a basic (shallow) environmental scheme determined by the Member States.

The allocation of budget resources should be incentive-based so that CAP funding is allocated to Member States **based on performance as well as needs.**

Proposed structure of direct payment in EU

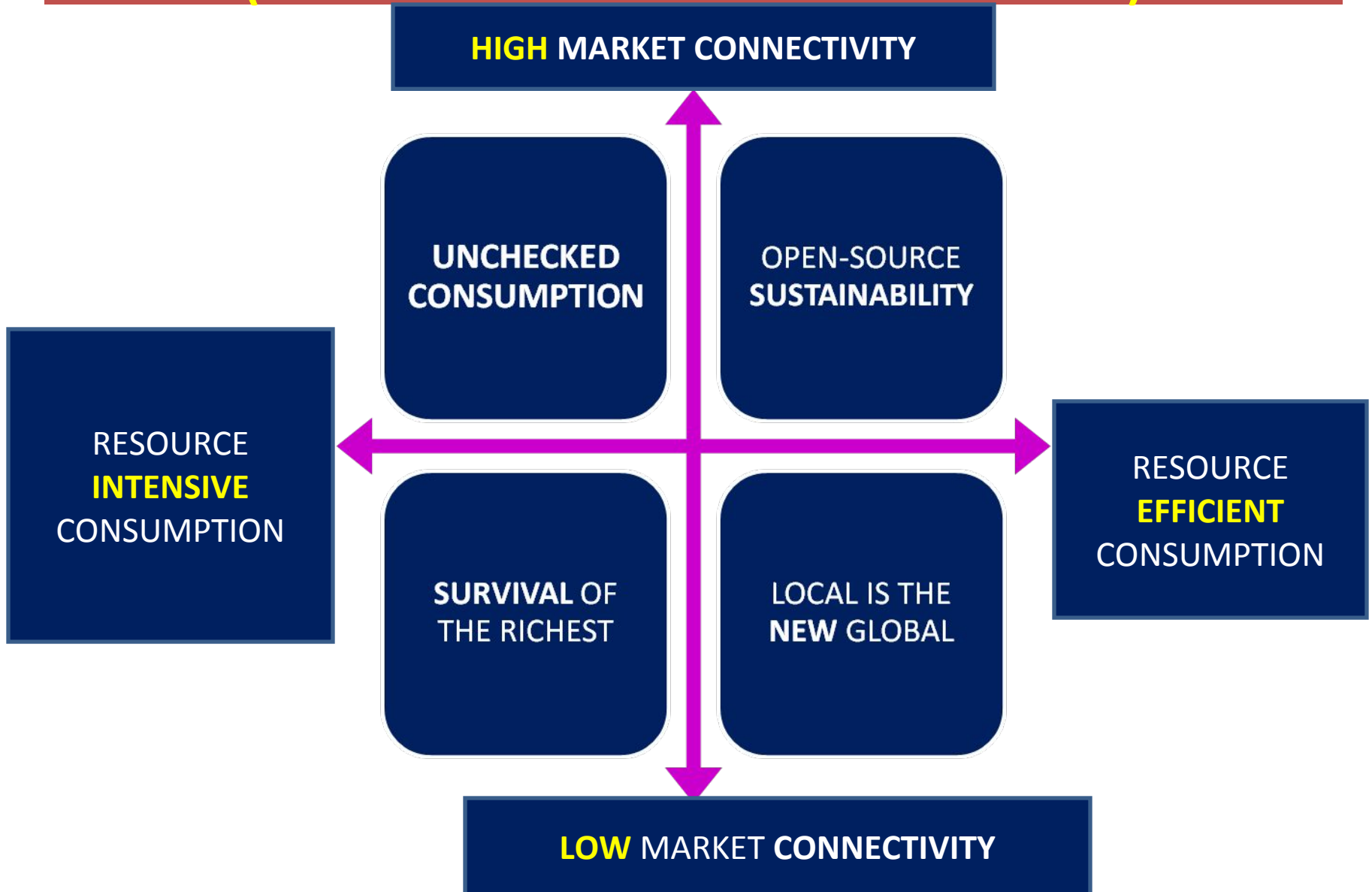
source: (COMAGRI)



Attracting younger generation into farming

- Top –up payment to young farmers **(EU)**
- Subsidy to new young farmers during a training period (maximum three years) and the initial operation period (maximum five years) – **Japan**
- Young farmers project focusing on farmers under 41 years old **(Turkey)**

SCENARIOS OF FOUR POTENTIAL FUTURE WORLDS (SOURCE: WORLD ECONOMIC FORUM)



Transnational issues

- Trade barriers (WTO)
- Technology and investment barriers (FDI, IPR)-WIPO
- Ownership and competition issues
- Climate Change and pollution spillovers/externalities (UNFCCC)
- Differential Mobility of Resources
- **Transnational Land deals**
- Virtual water trade
- Biodiversity loss
- Sustainable Development solutions network

Continental breakdown of target regions for transnational land deals for agriculture

Region	Number of concluded deals	Share in deals (%)	Total size of concluded deals (Million ha)	Share in area (%)	Average area/deal (ha)
Africa	422	42	10	37	23697
Eastern Europe	96	10	5.1	19	53125
Asia	305	30	4.9	18	16066
Latin America	146	15	4.5	17	30822
Oceania	35	3	2.2	8	62857
Total	1004	100	26.7	100	26594

Source : Nolte et al (2016)

- **The top 5 target countries where the international acquisition of agricultural land is most concentrated account for 46% of the total size of all concluded agricultural deals.**
- **These countries are Indonesia, Ukraine, Russia, Papua New Guinea and Brazil.**
- **Two groups of target countries**
- **Countries with high GHI and a high dependence on their agricultural sector.**
- **Countries with low GHI and agriculture is proportionally less important to national economy**

Top 10 investor countries in transnational land deals

	2000-2011		2012-2016		2000-2016	
	Country	Total land Size (000 ha)	Country	Total land Size (000 ha)	Country	Total land Size (000 ha)
1	USA	3112	Malaysia	934	Malaysia	3737
2	Malaysia	2803	Singapore	712	USA	3314
3	UK	1416	Cyprus	445	UK	1838
4	Saudi Arabia	1414	UK	422	Singapore	1679
5	India	1140	China	296	Saudi Arabia	1438
6	Hongkong	1082	Netherlands	264	Netherlands	1264
7	Netherlands	1000	Virgin Islands	204	India	1245
8	Singapore	967	USA	203	Hong Kong	1082
9	China	709	France	195	China	1006
10	Argentina	602	South Africa	191	Argentina	744

Transnational Land deals by investor type and target region

	Africa	America	Asia	Europe	Oceania	Total	Share (%)
Investor Type	Area in 000 hectares						
Private Company	4571	2139	1247	2224	1907	12088	43
Stock Exchange listed company	1683	1334	3152	2257	60	8486	30
Investment Fund	1254	809	6	452	0	2521	9
State-owned entity	422	190	277	36	0	925	3
Individual entrepreneurs	223	314	6	106	0	649	2
other	67	0	0	7	0	74	0
No information	2332	31	522	55	263	3203	11
Total	10552	4817	5210	5137	2230	27946	100
Share (%)	38	17	19	18	8		100

Source: Nolte et al (2016)

Transnational land deals – domestic partners engagement extent

Investor Type	Total area (A)	Area involving domestic partner (B)	Share of B in A (%)	Total deals (D)	Deals involving domestic partner (E)	Share of E in D (%)
	Size (000ha)	Size (000ha)				
Private Company	12088	1892	16	407	59	14
Stock Exchange listed company	8486	1554	18	299	50	17
Investment Fund	2521	365	14	89	9	10
State-owned entity	925	192	21	62	12	19
Individual entrepreneur	649	42	6	31	7	23
other	74	3	4	8	1	13
No information	3203	827	26	165	25	15
Total	27946	4875	17	1061	163	15

Former land use

- In targeted land 58% is cropland, 27% is forest land, 5% grassland and 10% is marginal land
- Former land use of targeted area-
 - Commercial Agriculture -43%
 - Smallholder Agriculture- 31%
 - Pastoralists – 5%
 - Forestry- 16%
 - Conservation – 5%

Former land ownership in land dealt

- Private (Large Scale) – 32%
- Community -28%
- State- 25%
- Private (Small scale)- 15%

Agricultural intentions across regions (% of area)

	Africa	Europe	America	Asia	Oceania	Global
Agrofuels	32	1	29	16	16	21
Food crops	39	45	50	21	30	38
Live stock	3	17	16	1	11	9
Non-food Agricultural commodities	9	1	1	29	3	9
Agriculture (unspecified)	17	36	4	33	40	23
	100	100	100	100	100	100

Source: Nolte et al (2016)

Attitude towards new technologies

- GM crops
- Nano-technology
- Synthetic biology
- CRISPR

	Big six in Global pesticide market	Share (%)		Big 7 in global seed market	Share (%)
1	Syngenta	20	1	Monsanto	26
2	Bayer crop science	18	2	Dupont(pioneer)	21
3	BASF	13	3	Syngenta	8
4	Dow Agro Sciences	10	4	Limagrain	5
5	Monsanto	8	5	Dow agro sciences	4
6	Dupont	6	6	KWS	4
	Total	75	7	Bayer crop science	3
				Total	71

Arguments

- Market power vs cost efficiency
- Static gains versus dynamic gains
- Appropriability vis a vis Cannibalization
- Realization
- Need for new theories and empirical methods in Economics

Access to seeds index report-2016

Global index of field crop seed companies

Rank	Company
1	Dupont Pioneer
2	Syngenta
3	Bayer
4	Monsanto
5	Dow Agrosiences
6	Group Limagrain
7	KWS

The index is relative ranking of field crop seed companies with integrated business model covering full seed value -chain, with seed revenue over 1 billion \$.

Top 10 countries generating the highest spillover in terms of importing carbondioxide emission

Rank	Country	Technology adjusted net imported Carbon dioxide emission (t Co2 per capita)
1	Botswana	4.3
2	Singapore	4.2
3	Mauritius	3.7
4	Australia	3.2
5	Swaziland	2.7
6	Namibia	2.7
7	UAE	2.3
8	Montenegro	2.1
9	Slovak Republic	2.1
10	Cyprus	1.9
	Source	SDSN

Top ten counties with the highest import of groundwater depletion embodied in trade

Rank	Country	Imported groundwater depletion (m ³ /year/capita)
1	Qatar	148.2
2	Bahrain	112
3	Oman	97.7
4	Djibouti	77.7
5	Kuwait	42.6
6	Mauritius	42.4
7	UAE	40.7
8	Saudi Arabia	27.1
9	Gambia	26.6
10	Canada	20
	Source	SDSN

Top ten countries with the highest import of biodiversity loss embodied in trade

	Country	Imported biodiversity impacts (Species lost/million people)
1	Luxembourg	2
2	Singapore	1.6
3	Djibouti	1.4
4	Kuwait	1.3
5	UAE	1.2
6	Belgium	1.1
7	Netherlands	0.9
8	New Zealand	0.8
9	Malaysia	0.7
10	Oman	0.7
	Source	SDSN

Top 10 countries with the highest net per capita imports of reactive nitrogen embodied in trade

	Country	Net imported emission of reactive nitrogen (Kg/capita)
1	Luxembourg	965.4
2	Singapore	748.2
3	Kuwait	569.2
4	Switzerland	432.4
5	Israel	381.9
6	UAE	328.6
7	Norway	311.8
8	Japan	259.9
9	Malta	255.2
10	Mauritius	226
	Source	SDSN

Top 10 countries with the highest net per capita import of SO₂ emission embodied in trade.

	Country	Net imported So2 emission (Kg/capita)
1	Luxembourg	60.9
2	UAE	58.4
3	Switzerland	34.4
4	Norway	34.2
5	Belgium	30.1
6	Denmark	24.8
7	Qatar	23.8
8	Cyprus	23.2
9	Ireland	22
10	Finland	21.1
	Source	SDSN

What is needed?

- Action at global level, national level and sub-national level
- Inter-sectoral Co-ordination
- Action at individual level

Some critical thinking for India

- **Agriculture state subject**
- **Regionally differentiated MSP (Brazil)**
- **Long to medium term based income insurance for farmers**
- **Pension for farmers**
- **Eco-regional planning**
- **Conditional payment of MSP**
- **Revisiting priority sector lending policy (Brazil)**
- **Limit on the average revenue per tonne that can be earned by transport sector for transporting agricultural commodities (Canada)**

- **Agricultural Youth green job initiative (Canada)**
- **Market Nutrition Coupon Program (Canada)**
- **A “red line” on arable land (China-124.3 million hectares)**
- **Returning farm land to forests (China)**
- **More tax on vacant farm land , reduction in tax if owners lend land to farmland bank (Japan)**
- **Winners paying losers (Korea)**
- **Risky products for which import health standards are not set, will not be imported (New Zealand)**
- **Basin Based Support program (Turkey)**