

Land capability classificationLand mgmt concept

- ① land is basic resource in agri. It has ↑ social imp.
- ② It a/c for wealth, power, etc in Indian feudalistic society.
- ③ Bhare: Bhooman Movement.
- ④ Brit revolts for lands.
- ⑤ shud tc of agri product, productivity, modernisation, fertility, erosion, salinity, desertification, quantity mgmt, ownership,
- ⑥ land area for various uses must be rationalized. also which land to be used for what purpose " " " " → system of land classification.
- ⑦ there shud be basis for land distribution in forest land shud be for tribes.
- ⑧ land alienation → land taken from locals → locals interest in land mgmt ↓. ∴ req. of correct ownership.

LCC

Land capability classification.

- purpose
 - (1) land use nationalization based on its suitability.
 - (2) classification on basis of quality. < land for agri use. " " non-agri-use.
 - (3) 1st given by US: Tennessee valley authority.
 - (4) Most imp factor is "land is erodable or not". Land not liable to erosion is used as agri land. Other factor is fertility (nutrients, texture).
 - (5) erosion decided by slope of land largely. ∴ LCC is agricultural land classification, actually a fn of slope. $LCC = f(slope)$
 - (6)

steep slope land	→	Non-agri-use.
gentle " "	→	some agri.
more " - flat - "	→	for agri.
 - (7) This classification went a/c for factors like clay, horizon etc.] categories < steep, gentle, etc.
 - (8) LCC has been adopted by ICAR. (delhi) A class → for agri] ICAI B class → not "] less suitable
 - (9) ICAR divided land into 2 groups
 - (10) further A has grades I, II, III, IV. B has V, VI, VII, VIII.

grade 1	excellent, flat, well drained land.	A: 1234
" 2	good land, minor lim ⁿ (slope, irriga ⁿ or drainage)	B: 5678
" 3	Moderately good land with imp dim ⁿ of drainage, slope	

- grade 4 : fair land with severe limitations.
 grade 5 : for grazing, forestry. has ^{high} rockiness, shallow soil n slope.
 grade 6 : moderate limⁿ for even forestry / grazing.
 grade 7 : severe ltd
 grade 8 : unsuitable for grazing n forestry, used for habitation, sanctuaries. E G M F G M S U

scheme is descriptive bcz for prac applicability by farmers who will use land, it is desirable that scheme dont employ qualification vigorous. It is also not comprehensive enuf beyond slope consideration that decy'd erodability. (fertility n slope). not horizon^{al} clay.

Land reforms

These involve: who is owner, how much land, security for ownership ryls n purpose of land. These are relevant for welfare, socialist objective under C.

- historical reasons of land alienation % (R ^{proten} ^{rent} F) destroyed
- ① symbiotic relation b/w ruler n farmer by British for their own dev interests.
 - ② They nationalised land n forests under crown, appointed zamindars; middlemen; called Mahalawars in N.W, zamabardars, jajmaan. S. And has Ryotwari. → landed class → Absentee landlordism. £
 - ③ farmers n zamindars both has incentives for land dev.
 - ④ permanent settlement.
 - ⑤ change in cropping pattern due to tax demands n for brit industries (like cotton) → famines. → farmers borrow from lenders → agri disincentivized → ↑ land loses.

Post independence

- ① zamindari gone.

4 phases of land mgmt

- ① 1950-70
ownership, removal of zamindari, security of tenure, social aspects, rent nationalization, productivity enhancement, GR, food security, maximize land output, HYV seeds, irrigatⁿ etc.
- ② 70-85
ecological aspects (soil, water, land), optimization n not maximizing, n, sus dev.
- ③ 85-95
watershed, diversification, optimization, surplus prodⁿ, organic mgmt, food mgmt etc.
- ④ 90+

optimize not maximize.
 (watershed organic optimization)

Reforms Specifics

- ① removing intermediaries by © but still exists informally.
- ② Rent & Tenancy reforms
- ↳ Rationalisation of rent : $\downarrow$ 4m 50-60% to 10%. but subject to state legislation as land is subject

(b) tenure security : no arbitrary auction.

(c) ownership : if farmer cultivates on a land 4 a p/r tym then he can claim that land (Begar open)

- ③ ceiling & re-distribution : biggest failure of land reforms.
- 1 household cnt hold > than $\propto$ amt of land. diff is distributed to poor farmer. ✓

Prob: ① lack of land record → no way to find surplus land.

② ownership manipulation

③ $\downarrow$ pol will.

④ kisan sabha movement fizzled out

- ④ consolidation :
- fragmentation → $\downarrow$ scale agri, $\downarrow$ technology use, resource dupliⁿ.

chakbandi → mutual agreement for consolidation.

↳ probs are $\downarrow$ records, $\downarrow$ trust, $\downarrow$ objective LCC, issues of diff fertilities.

- ⑤ cooperative farming : groups of farmers : not worked well in India. allied non agri sectors (sericulture etc) have better record.

Agri productivity

- (1) It is expⁿ to evaluate quality of agri. Produce/Area.
- (2) helps to compare agri of various regions

Ways to evaluate

- ① Agri n₁ (Most ideal expⁿ)

It is Output / input in %.

Probs in this expⁿ :-

- subsistence agri in India → sm output not accounted.
- difficult to quantify exact output.
- value of domestic inputs, agri waste used as manure is not a/c.
- labour is not monitorized. (family's wageless work).
- subsidy costs distort input value & controlled pricing (MSP) distorts output value.

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- η don't allow cross product comparisons.
- $\therefore$ not objective method. so productivity is convenient but not best method.

$$\frac{\text{output}}{\text{input}} = \frac{\text{kg / quintal}}{\text{hectare}} = \text{yield / productivity}$$

factors for productivity $\leftarrow$ human factors $\left\{ \begin{array}{l} \text{tech} \\ \text{seeds} \\ \text{crop choice} \end{array} \right.$
physical $\left\{ \begin{array}{l} \text{soil, rain, T, slope} \dots \end{array} \right.$

Agri productivity relates to agri η under condition of fav natural factors like good soil etc but under adverse condⁿ where agri is $\uparrow$ intensive, $\uparrow$ productivity would imply $\downarrow \eta$.

Pattern of India's agri productivity

Spatial temporal.

$\rightarrow$ 3 areas $\left\{ \begin{array}{l} \text{high n very high} \\ \text{moderate} \\ \text{low n very low} \end{array} \right.$

high n very high productive areas
moderate
low n very low.

High n very high (4 areas)

- ① plantation regions : tea, coffee, spice etc. commercial systems. mechanized, tech, inputs are modern. But $\downarrow \eta$.
- ② NR regions : W. UP, Punjab, Chhatis, N. raj.
- ③ Kaveri basin n irrigated tracts of black cotton soil
resp for oilseeds, rice, cotton, kiwi (Karna.), barley
in W. ghats.
- ④ brackish water aquaculture : artificial ponds, mabs, fishing etc for exports. commercial agri. But such ponds are grown in agri fields itself degrading soil in A.P & Kerala.
- ⑤ saffron in pampore -

P, GR, K, P, S

Moderate
adjoining areas to that of high. N. plains, river valleys, coasts, rice regions, tobacco regions etc.

Low n very low
due to unfav phys condⁿ n adverse human conditions.
except plantation areas, plateau interiors (Jalgaon, Bichchh, Kathiwar, W. raj, Bundelkhand, Malwa, E. raj.
Wid dry climate, (red soil),
Parts of central highlands like
These areas if pursue $\uparrow$ productivity $\rightarrow$ soil probs. $\therefore$ shud follow dry land farming n allied sectors,

Temporal patterns of agri productivity

① pre independence phase

Brit rule, colonial interference, zamindari, cropping pattern
→ ↓ productivity.

② Post inde - Pre GR

total produce increased in terms of weight due to area expansion. focus was on food crops & fallow lands wr cultivated. → no productivity ↑. inputs, methods wr poor, mechanism was ↓ & fragmentation was ↑.

③ Post GV (1966+)

↑ productivity due to various benefits. produce today is 5 times new. (50 → 250 MT) from same NSA.

but there r disparities (inter-reg, inter-crop).

- wheat P_y grew 4m 650 → 2700 kg/ha. x4
- rice " " 670 → 2200 kg/ha. x3.1
- but pulses & millets stagnated. late ly millets have improved.
- benefits hvnt spread out 4m GR areas.
- drylands (though grow most cash crop of India) remained disappointing
- historically poor reg remained as such.

<u>rice</u>	egypt: 9.8 <u>MT/ha</u> , US: 7.8, Korea: 6.7, <u>India: 2.9.</u>
<u>wheat</u>	china: 4.2, France 7.5, <u>UK 7.7</u> , " : 2.7.
<u>cotton</u>	china: 11, <u>brazil 11</u> , Pak 7.5, " : 4.5
<u>Ind is 52nd in rice productivity, 38th in wheat, 138th in pulses</u>	

causes of ↓ productivity

subsistence, fragmentation, ↓ reforms, degradaⁿ, ↓ credit, ↓ agro-industries, ↓ bkend/ frontend infra, ↓ input intensive, ↓ fert used, rainfed

Productivity Improvement

- ① not req drastic improvement in inputs but in infra & credit.
- ② productivity of rice can b ↑ to 4000-6000, wheat: 6800.
- ③ It shud be optimized not intensification. sus-dev is d way.
- ④ shift towards organic farming.

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③ blanket mechanization shud b done. It shud b selective mechanization instead of blanket.

cropping / Agri intensity

on same land a crop can be made more intensive by:

- ① growing crop more than once.
- ② ↑ inputs. (water, seeds, fertls).
- ③ not exhausting land (fertility)

↑, inputs & ↑ fertility, rotation, ley farming, diversification

It is a tech to increase productivity & a measure of land intensity.
$$= \frac{CISA}{NSA} \times 100 \%$$

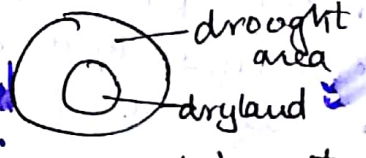
factors < human (more imp).
physical

Need to ↑ CI

food sec, grow more from ↓ land, export, commercial use, manage land & water resources, generate emp.

ICI shud b sustainable. No -ve effect on soil. crop rotation shud b done. Ley farming shud b done (grow grasses & root crops, diversify crops)

Dryland farming

rained areas 

- ① It is not synonymous to dry areas (< 75 cm rain) that lie on S, west of 100 cm isohyete.
- ② these are instead areas of dry areas which r rained n not irrigated
- ③ en: punjab, tharyana are dry areas but not dryland
- ④ here emphasis is not to develop irrigan infra but to develop water resistant / tolerate crops & dev them as rained areas.
- ⑤ Hyd Index defines it as agri in which crops are grown w/o irrigan in areas w/ annual rain < 50 cm.
- ⑥ Int'l crop research Inst for semi arid areas: Hyd.
- ⑦ drylands are also defined in terms of practices where farmer is forced to grow drought resistant crops like millets, pulses etc.
- ⑧ It also inc non-crop options like animal rearing, poultry etc.

Areas

- ① Plateau region w/ red soil, < 60 cm rain excluding karni.
- ② deccan trappen, black soil area like widharbh.

③ central uplands (Sathpura, Deundelkhand, B. raj ...)

④ Hill areas.

⑤ Raj uplands part of Marusthali, Bagad region

⑥ Ruchchh, Kathiawad.

central.
plateau
deccan
hills
marusthali
Ruchchh
Kathiawad

Imp of dryland

① abt 75% of India's NSA is rainfed. More than half of this is dryland. (40%)

② the r limⁿ of water resources.

③ monsoon dependent → ↑ vagaries.

④ drylands have to learn dryland farming.

⑤ drylands shares:

food grains: 40-50%.

pulses: 75%.

oilseeds: 60%.

Millets: 90%.

Most (100%) cash crops.

%	
100	cash crops
90	millets
75	pulses
60	oilseeds
50	grains
40	poor

CM POU
100 90 75 60 50

⑥ region present ↑ prospect of animal husbandry

⑦ Stagnation in CR belts.

⑧ Pulses, millets → carb, protein → ↓ malnourishment.

⑨ these areas carry > 60% of Indian poor. (social probs).

⑩ vulnerable to desertification & other ecological problems.

⑪ sub R → migration.

Probs of dryland

droughts, crop failures, ↑ fallowing, poverty, suicides, vicious circle, regular agri probs want to be followed, dtd crop choice.

Solutions

① ICAR, CARI (centre for arid zone research inst) have made drought resistant crops. (chickpea, pigeon pea etc).

② special tech, manure scheduling for efficient input usage.

③ summer ploughing, pre-monsoon tillage.

④ land shaping, bunding, grading to ensure proper H₂O appⁿ.

⑤ deep applicⁿ of fertilizers & seed sowing by drilling methods.

⑥ crop rotaⁿ → diversify crop failure risk.

⑦ RW harvesting, GW recharge.

⑧ encourage animal rearing, agro based industries, non-farm emp, forward/bkward linkages.

⑨ scientific planning, agro-climatic planning.

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GR → socio-eco, ecological effects

- ① launched to ↑ productivity, modernize agri.
- ② based on HYV seeds, (water intensive, input →, yield ↑)
- ③ Research by Lord foundation of US by Norman Borlaug.
- ④ 1st dn in Philippines for rice & Mexico for wheat.
- ⑤ India 1st introduced it for wheat. By Swaminathan.
- ⑥ Intensive agri district prog renamed to Intensive Agri area prog and then to HYV. IADP → IAP → HYV

conditions prevailing at that tym

- ① 1st FYP → charrod demmar model → balanced dev → a stark taking exercise with modest targets. → results exceeded.
- ② 2nd FYP → Mahalanobis / Nehruvian → deliberate imbalance. prob of no trickle down ... → food crisis

PL 480 signed w/ US for food aid under humiliating condⁿ.
→ adopⁿ of UR or HYV programme.

2 NSP loans.
later droughts.
67: loans 4Mn

Objectives

- ① end food crisis
- ② food self sufficiency.
- ③ modernise agri
- ④ ↑ productivity

⑤ lead to industrial & overall dev

Strategies used

- ① wasteful to modern, sci methods & inputs.
- ② deliberate imbalance spreading resources (scant) to sm sectors w/ high level equi. them n. not to level stagnat.
- ③ This opt for a ↑ level equilibrium & not settle 4 ↓ level stagnat.
- ④ resource constraints, crisis situation → imbalance strategies ∴ prog was crop specific, region specific, class specific (rich farmers) → today's disparities.

Benefits

- ① produced surplus, solved food crisis, self sufficient, 5 times production, ↑ productivity, sci inputs, m/c, implement
- Made agri commercially profitable, ↑ forward linkages, ↑ credit availability by formal instituⁿ (KRB, NABARD), ↑ bkward linkages, industrial interface, ↑ wages, emp (mixed result)

demerits

① Began modern agri disparities — inter-crop
inter-reg
social.

Inter-crop disparities :

Rice wheat ↑ but millets, pulses, oilseeds, dry crops ↓ → imported.

Inter-reg : CR belt (P, H, W, UP, N, Raj) grew in agri economy but others ↓. Rainfed areas were neglected.

Social disparities : NCRB — 1997-2009 — > 2 lakh farmer suicide mostly in Madhya Pradesh & Telangana.

Ecological probs

- ① Input water intensive → CW ↓, salinity ↑
- ② ↑ fertilizers → soil acidification → ↓ fertility, land degradation.
- ③ New lands of CR reg have ↓ productivity.
- ④ ↑ monocropping → system became unstable.
- ⑤ Indigenous biotic resources lost gradually. Exotics r not pest resistant.
- ⑥ water poll, eutrophication
- ⑦ ↑ pesticides → toxicity of crop, land, water.

Emp

Real wage rates of landless labourers ↓ as m/c crowd out

There is a call for evergreen rev (sus-dev based agri).

Flaws / Reasons for drawbacks

- ① misjudging technology, error in strategy, faulty assumption.
- ② Its main purpose was crisis mgmt n not to deliver all aspects of dev. This was a misplaced expectation.
- ③ as tech is input intensive, it is faulty to expect ↑.
- ④ didn't alc for input sensitivity. It was assumed to be only input intensive. Large farmers have higher ability, adequacy & hence only they made profits but not small farmer who could not provide intensive inputs. → class disparity.
- ⑤ ↑ produce don't guarantee ↑ commercial gain. Infra, forward linkages are required. It did not convert character of India's agri.
class disparity
dist, training, extenⁿ, strategy
input insensitive, forward linkages
faulty assumption, expectation (?) Mudit Jain

- ⑥ ↓ industrial packages, processing facilities didn't help UR.
- ⑦ not supported adequately in all areas pl'r in extenⁿ & farmer training.
- ⑧ wrong subsidy policy for fert (N₂ based dyk urea) → ↑ usage → overusage → eutrophicaⁿ. potash had ↓ subsidy.
∴ this was faulty pricing in agri inputs.

social forestry

given in 1952 forest policy & abolished in 88.

- ① designed to meet social objectives.
- ② explicit focus on livelihood, poverty, food sec, firewood, SMEs.
- ③ to sustain livelihood, emp, local participⁿ, empower local communities, address ecological issues like land mgmt.
- ④ traditional forest mgmt practices/policies excluded local participⁿ.

How rural/tribal popⁿ depend on forests?

- ① energy demand: > 80% of domestic demand is from firewood & animal products.
- ② handicrafts/households: need forest products like sandalwood, Lac, wood, matchsticks, apiculture etc.
- ③ women empowerment: & girl child edu - firewood foraging, sourcing water, phy labour cause troubles.
- ④ Non-crop options: livelihood sec, risk diversificⁿ, grazing & animal husbandry.
- ⑤ usufruct species: from which v get useful products.

objective cntd..

- ③ grow forest to meet social objectives in all psbl vacant lands.
- ④ species shed b usufruct. grow on any available community land.
- ⑤ save traditional forests. → landmgmt of vacant fallows.
- ⑥ ↑ forest n tree cover but primary obj one social in nature. (2,3,4)

strategies

- (1) trees along wastelands, rail tracks, roads, community land.
- (2) ↑ subsidies + free saplings.
- (3) monetary benefits of maintaining saplings.
- (4) local participⁿ → mass movement.

free saplings
+ monetary
benefits for
maintaining saplings.

components

community
farm
agro

- ① community forestry : saplings on community land.
- ② Farm - " : trees as regular crops in agri land.
This became a -ve point later as good fertile farms were encroached → unemployment due to ↑ commercial farming.
- ③ Agro-forestry : trees + crops , +ve one.

evaluation

- ① evaluation based on evaluating outcomes against social objectives for which prog was launched.
- ② considered a failure because :-
 - (a) species select wasn't apt . eucalyptus grown instead of useful fruits . It lacks natural enemies being exotic . It is inflammable , want to be used as firewood , don't give shade , no fruits , declined LW & caused forest fires & acted as weed that stopped other plant's growth .
- ③ farm forestry → ↑ economy → more practiced by large farmers led to replacement of food crops, ↓ emp, land diversion .
Guyana in 1985 had best record in social forestry expenⁿ due to farm forestry .

Agro forestry

nota programme
nor a scheme but
a component of S.F.
not a scheme. It is

- ① It is not a prog unlike Social forestry.
SF's component . a method in forest mgmt.
- ② It is a holistic method involving trees w/ regular crops + non-crops .

advantages

- ① afforestation opⁿ if land is ↓ .
- ② land mgmt , soil-erom mgmt in slope hills .
- ③ part of watershed mgmt . slope → forest → H₂O mgmt .
- ④ diversify agri income .
- ⑤ support rural popⁿ w/ MFP .
- ⑥ choice of species in combiⁿ is scientifically decided → nutrient .
mgmt , soil fertility mgmt ex: teak + coffee in w. ghats .
teak provides shade to coffee.
others inc coconut + pepper etc.

afforestation, choice, combination
activity, land, soil, watershed
MFP, sci driven, income diversity

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① non-crop income

- silvipastoral systems (forests + pastures)
 - aqua-silvi-sys along coasts (roco + teak along ponds)
- ② promotes sustainable agri.

Livestock resources

- ① for livelihood sec. → income, emp., draught power & manure
- ② special imp in current sustained economic growth, rising income, ↑ urbanisation, taste-changes, dietary changes towards milk, egg etc.

Milk

largest producer. ≈ 128 mn tonne in 2011-12. /capita : 290 gm/day
5.1. ↑.

Meat

from cattle, buffalo, sheep, goat, pig, poultry : 5.5 mn tonnes.
13.1. ↑.

Wool ≈ 45 mn kg. growth = 4%.

Egg = 66 bn. 5.5.1. ↑. milk meat wool
egg fish.

- Fish • 2nd largest in world. 5.5.1. of world production. = 8.8 mn T
- more than 80% cm from inland ✓
- GDP from fisheries in 2010-11 = 5.1. of agri's GDP ✓
- exports more than doubled during 11th plan ✓

Policy for fishery dev emphasizes inland fisheries p/r aquaculture
which has been imp in ↑ production, exports, ↓ poverty.

- ③ world's largest livestock popⁿ : $\frac{1}{2}$ of buffaloes, $\frac{1}{6}$ goats

Livestock health

- ① foot n mouth disease, PPR, swine flu, avian influenza → ↓ growth.
→ loss of > 20000 cr.
- ② timely immunization can prevent these. A, D, AF
- ③ dept of animal husbandry, dairy, fisheries (DAF) has initiated nat'l prog for prevention & control of these diseases.
ex FMD control prog in 2003.
- ④ ↓ vaccines, ↓ cold storage → hinder fast implementation,

⑤ Veterinary support is poor in infra & equipments, tech-manpower is ↓. DADF has begun Establishment and strengthening of existing veterinary hospitals & dispensaries (ESVHD). → for timely diagnosis, treatment, door-step veterinary support should be enhanced.

⑥ computerized National animal disease reporting system (NADRS) started in 2010-11 → faster, reliable disease reporting, data processing, containment of disease.

∴ challenges of health sector hospital, vaccine, cold store, reporting

Cattle & buffalo breeding

- ① National project for cattle and buffalo breeding (NPCBB) → ↑ genetic upgradation of bovines mainly via artificial insemination. semen production, conception rate have ↑, cross breed cattle have ↑.
- ② Minimum std protocol for quality semen prodⁿ is implemented.

Dairy sector challenges

small herds, ↓ productivity, ↓ credit, ↓ organized markets, ↓ Artificial insemination n/w, ↓ skilled manpower, ↓ quality breeding bulls, diseases, fodder, degraded/enroached grazing lands.

Sols

- ① support genetic upgradation progs.
② ↑ breeding infra under NPCBB.
③ sci prog like embryo transfer technology (ETT), multi ovulation (MOETT), artificial insemination.
④ ↑ skills.

DADF
NADRS
NPCBB
ESVHD
ETT
MOETT
artificial insemination
IDDP

Dairying

- ↑ income, ↑ emp
• DADF → cooperative infra, revitalization of sick dairy cooperative feds, ↑ quality milk & milk products.
• DADF implemented intensive dairy dev prog (IDDP) (2012-13) → assistance to unions/feds for ↑ milk prodⁿ, procurement, preservation, transportation, processing...

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dairy schemes

- ① strengthening infra for quality & clean milk production : 2003
aim → ↑ awareness among dairy farmers, ↑ testing equipments to ↑ quality of new milk produced. It provides training, set up bulk milk coolers (BMC) at cooperatives, strengthens labs.
- ② Assistance to cooperatives (1999-2000)
to revitalize sick cooperatives/feds. Rehab plan by NDDB.
- ③ Dairy venture capital fund (DVCF) / dairy entrepreneurship dev scheme (DEDS)
DVCF (2004-2010) ^{modified to} DEDS (2010) **DVCF → DEDS**
- ④ National dairy plan
(NDP phase I) (2011-12 to 2016-17). Supported by IDA, UOI, End implementing agencies (EIA), NDDB. **2012-17: NDP-1**

Aims of NDP-1

- ① Meet projected demand of 150 mn tonne by 2016-17 from domestic production by ↑ village level infra for procurement, marketing.
- ② ↑ livelihood opportunities on fair terms.
- ③ launched scientifically planned multi state initiative for new process, policy, regⁿ → ↑ productivity, ↑ producⁿ.
- ④ ↑ access to milk processing sector to rural producers.
- ⑤ priority to high potential areas of 14 major milk states inc UP, P, H, MP, ...
- ⑥ ↑ superior quality semen at national scale.

Feed & fodder of livestock

- world's 10.7% ^{livestock} fodder banks, 4% GSA is for fodder. 35% gap, CSFNFDS
- ① imp for livestock sustenance.
 - ② ↑ P to grow food grains, oilseeds, pulses.
 - ③ India has world's 10.7% livestock.
 - ④ gap b/w demand-supply of fodder is increasing. (35%) as per NABARD.
 - ⑤ fodder grown only on 4% GSA.
 - ⑥ DADF implementing centrally sponsored fodder & feed dev scheme (CSFNFDS) during 2012-13 to reduce gap. It has 9 components to support all activities related to fodder dev.
 - ⑦ new component of establishment of fodder banks • established to procure surplus fodder.

Challenges for fodder & feed

- ① quality
- ② adequacy
- ③ area under fodder is reducing.
- ④ livestock are increasing.
- ⑤ improved fodder seeds production is ↓
- ⑥ diversion of crop residues to industry (paper, packaging etc).
- ⑦ ↓ authentic data on FAF
- ⑧ ↓ extension machinery
- ⑨ ↓ manpower (skilled)
- ⑩ area for coarse cereals (used as fodder too) has also declined.

Steps taken by gov

- ① revising (CSFFS)
- ② ↑ area for quality fodder seeds
- ③ ↑ quality seeds
- ④ use of community, waste lands
- ⑤ post-harvest mgmt intervenⁿ to procure / make use of crop residues

SOLS

- ① forest dept can play imp role. degraded forest areas under joint forest mgmt committees can be used.
- ② need for extension campaign for efficient utilisatⁿ & enrichment of crop residues, fodder crops, post harvest intervenⁿ
- ③ ↑ su^{pr} practices like rational balancing, utilisation of wasted crop residue, Azolla (supplement) production
- ④ MIS for proper data.

White Rev

- ① also called Operation Flood
 - ② 3 phases 1970-80 (OP-1), 80-85 (OP2), 85-89 (OP3).
 - ③ OP1, 2 focussed on cooperative based dev, social orgⁿ.
 - ④ OP3 on rattle productivity, medicines, breeding.
 - ⑤ 89-99 (technology mission in dairy dev) TMDD: → ↑ tech-
 - ⑥ 99+ IDPP (connectivity, cooperatives, breed, power, social dev, infra)
 - ⑦ this scheme has expanded to urban centres ex (delhi milk scheme)
 - ⑧ aims: animal husbandry, social dev, food sec (nutritⁿ, diet, protein)
 - ⑨ And has 1. of the ↓ / capita milk consumpⁿ. 290 gms / capita / day.
 - ⑩ ↑ protein malnutritⁿ ≈ 10 g / day.
 - ⑪ 50% of malnourished children of world in India.
 - ⑫ Meat intake ↓ (mostly vegetarians)
- ∴ Milk is imp.

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Recent dev in white-rev

- ① efforts to develop national milk grid to link surplus production areas with demand.
- ② ↑ exports by ↑ commercial surplus, ↑ productivity, quality.
(Denmark, Swiss & NZ are current export hubs).
- ③ encouraging commercialisation & pvt players is controversial among IDDP as it will crowd out small players.
- ④ Intro of exotic breeds, genetic engg, etc is against ecology.
→ ↓ genetic diversity in native breeds.

Aqua-culture

- ① fisheries sector dev by CSS & central sector schemes.
- ② assistance also from flagships like RKVY, national mission for protein supplements (NMPS).
- ③ National fisheries dev board: estb 2006 as a SPV for accelerated benefit dev of fisheries & aquaculture in sustainable way via upgrading tech, utilization / mgmt of resources, mgmt of post-harvest operan, marketing.
It is proposed to merge all CSS to NFDB → ↑ coordination, efficiency.
- ④ Marine fisheries dev scheme: dev of fish harbours, fish landing centres, post harvest infra like ice plants, retail outlets, safety implements, deep sea vessels, PPP.
- ⑤ Fishermen welfare scheme: insurance, house construction.
- ⑥ IDB scheme: inland water bodies are surveyed & mapped.
Marine fisheries census is undertaken, regn of fishing vessels.
- ⑦ Challenges:
 - ① ↓ quality & healthy fish seeds & other inputs.
 - ② ↓ resource specific fishing vessels.
 - ③ ↓ awareness abt nutrin benefits, eco benefits.
 - ④ ↓ extenⁿ staff.
 - ⑤ ↓ training.
 - ⑥ ↓ utilization, ↓ productivity.
- ⑧ Sols:
 - ① ↓ approach via ↑ forward/backward linkages (seed to processing).
 - ② existing fish farmers dev auth (FFDAs) shud b revamped.
 - ③ involve cooperatives, SHGs in intensive aquaculture.
 - ④ ↑ culture-based capture fisheries & cage cultures in reservoirs etc.
 - ⑤ sustainable exploitn esp deep sea resources. ↑ productn via sea farming, mari culture, resource replenishment like artificial reefs.

aquaculture is cultivation of aquatic organisms. also called aquafarming, implies cultivation of aquatics under controlled condⁿ.

Mariculture: aquaculture in marine env. Aquaculture (AC) also inc agri, seaweeds, kelp, fish farming, shrimp farming, shellfishes.

• used in china since 2500 BC • began in europe in middle ages.
Americans in late 20th cent. ∴ It is a contemporary phenomenon.

Types ← algae, shrimp, multi trophic.

① Algaaculture prawn farming of algal species majorly microalgae like phytoplanktons, microphytes etc. Microalgae also called seeweed have commercial n industrial uses but their size & cultivan env (oceans) present challenges.

② fish farming: principle form of AC. fishes raised in tanks etc by fish farms ex: salmon, catfish etc. offers alternative to exploitn caused by overuse of wild fisheries.

③ freshwater prawn farming: freshwater prawn/shrimps

④ integrated multi trophic AC: IMTA. here by prod (wastes) from one specie are recycled to become inputs for 2nd. Fed AC is combined with organic/inorganic extractive AC for sus-dev, eco stability, social acceptability.

⑤ Mariculture special AC. cultivan of marines in open ocean, tanks, ponds etc. Non food products produced:- fish meal, nutrient agar, jewellery, cosmetics etc.

⑥ shrimp farming began in 1970s. demands in US, Japan, W. Eu. 75% of farmed shrimp is produced in Asia (china & thail). largest exporting country. Done in andhra (nellore).

Blue rev

(1) Prog to ↑ fish, marine products.

(2) In 1970. 5th FYP. by fish farmers dev agency.

(3) Brackish water fish farms dev agency were set up.

(4) improved breeding, rearing, marketing, export.

(5) ↑↑↑ shrimps. AP, TN led the way. Nellore: shrimp capital.

(6) > 1800 species of fish in sea n inland water in India.

(7) Marine fish: 50% of total. Kerala > Maharashtra > Karnataka > Gujarat > Goa

(8) season: sept - March

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- ⑨ arabian sea broad shelf → ↑ prodⁿ. (sardines, prawn, mackerel)
 ⑩ east coast: 28% of total marine fish. Craniam to Rameshwaram

Poultry: Meat + poultry Silver Revⁿ

- (1) 141 mn goats (2nd), 72 mn sheep (3rd in world)
- (2) Poultry sector ← highly organized commercial sector
unorganized sector. (basically 4 rearers).
contract farming (SAM farmers).
- (3) CSS: "poultry dev" 3 components funded are:-
- ① Assistance to state poultry farms for hatchery, brooding, rearing houses, laying houses, disease diagnostic facilities
- ② Rural backyard poultry dev: supply of backyard poultry to beneficiaries from BPL → income + nutrition.
- ③ Poultry estates to ↑ entrepreneurship skills mainly for educated but unemp & small farmers
- ④ Poultry venture capital fund: It provides finance thru bank for breeding farms, feed godowns, feed mills, labs, marketing etc
- ⑤ National poultry dev orgⁿ & CP perf testing centre: at Chandigarh, Bhubaneswar, Mumbai, Blore. » is at Gurgaon. Measures:
- availability of quality chicks.
 - diversification to rearing of duck, emu, turkey, guinea fowl.
 - training • Regular testing of stalks for perf evaluⁿ
 - produce germplasm in form of day old chicks & hatching eggs • analyz feeds too
- ⑥ Challenges
- ↓ feed ingredients like maize, soyabean at ↓ cost. feed: 70% of poultry cost.
 - diseases → losses (domestic + exports).
 - gap b/w demand n supply.
 - demand for trained, skill manpower.
 - large scale of target popⁿ 2 b improved in terms of productivity
 - ↓ processing, ↓ value addition.
- ⑦ Sols
- long term sustainable produceⁿ measures. ↑ maize, soya, ↑ alter feed sources, monitor outbreaks, MIS, market intelligence, ↑ training, ↑ urbanisaⁿ and ↑ quality awareness → ↑ quality, ↑ export quality, ↑ egg rearing, proper utilizⁿ of by products, prevent env pollution & livestock diseases.

factory farming :- ve: harms animals, health issues.
+ ve: ↑ productivity, state of art facilities

exports
live poultry, eggs, frozen eggs, egg powder, meat to Bang, S, S/W asia, Japan, denmark, US etc.

states

AP > Bihar > WB > TN > Maha.

A > B > W > T > M

imp farms in Mumbai, Kolkata, Delhi, Chennai, Hyd....

1st outbreak of avian influenza in India in Maha in 2006.

Imp varieties : hitkari, vanaraja, shyama, cani etc.

CPDO other fns : implements gov policies, updation of training unit into int'l tropical avian mgmt mst

Sericulture

(1) silkworm larvae are fed on mulberry leaves and they spin their cocoons around a twig placed near them. It is wound with a gum called sericin which is removed by hot water then reeling done.

(2) leaves of mulberry, maheia, sal, ber, kusum.

(3) India 3rd in world.

(4) 4.5 lakh ha area under mulberry.

(5) 15° N - 34° N latitudes.

(6) ≈ 60 lakh emp.

(7) raw silk : Kar (65%) > AP (17%) > WB (8%) TN (5%)
assam (3%)

mulberry
maheia
sal
ber. kusum

central silk board

Kar + AP + WB = 90%.
82%.

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apiculture / golden bee

① honey, beeswax, pollinaⁿ, for sale.

② kept at place called apiary.

There are > 20K wild species many of which rear their young in burrows, small colonies. colonies can be as large as have 1 lakh bees.

③ done by aboriginals in africa, asia, Aus, S America.

④ domestication began gradually in hollow logs, wooden boxes, pottery vessels etc.

⑤ moveable comb hive

earlier honey harvesting was crude method of breaking honeycomb. → unhygienic. Modern frames can be freely manipulated & honey supers with frames full of honey can be taken & extracted for their honey crop.

• nectar → honey

- adv : (1) req ↓ T, money & infra investments
- (2) honey & wax can be produced 4m area of diff bgs value
- (3) dsnt compete w/ resources, w/ other enterprises.
- (4) +ve ecology results → pollination, ↑ yield of crops.
- (5) nutrition.
- (6) can be initiated by individuals.
- (7) ↑ market potential.

harvesting : during & after 2 main flowering seasons
namely oct/nov & feb-june.
a ripe comb is light in colour & filled with honey.

R.N. maitra was pioneer worker in India beekeeping.
now beekeeping with Apis mellifera predominates in India.
there is revival of industry in rich forest regions along sub-himalayan mountain ranges, w. ghats. ∴ activity is mainly forest based.

imp in traditional medicines.
traditional village industries commⁿ to revitalize traditional village industries hastened dev of beekeeping.
mellifera is european bee. Indian bee is Apis cerana. Mellifera
in J&K, Punjab, HP, Haryana, UP, Bihar, WB.
done by tribals & forest dwellers
Major regions : Raj, UP, MP, Maharashtra, Eastern ghats (Orissa, AP),
sub-himalaya & adjacent foothills.

Agricultural Regionalisation

- ① Agri is diverse. Even areas w/ similar phys condⁿ do not have same form of agri. → understand & doc such varian & suggest modification if required.
- ② Analysis cant b dn at national scale due to ↑↑ diversities. shd b at micro level. in smaller convenient units (state or regions). known as agri regions.
- ③ ∴ agri-regⁿ (AR) is to study, understand, doc agri varian and diversity at a micro scale using small spatial units called regions.
- ④ diverse agri → diverse demandⁿ criteria → diverse schemes.
- ⑤ some schemes are:-
 - * Regionalisation based on dominant / 1st ranking crop: → regions like rice, wheat, cotton etc.
 - * based on crop combi: weaver / mappack scheme. rice + millet or rice + fishery etc.
 - * based on productivity.
 - * " " economic parameters. (intensity, infra, mechanisaⁿ etc).
 - * Multi-element criteria regⁿ based on type of agri practice subsistence or commercial; crops; livestock combi; scale of operⁿ etc. ex: Whittlesey's agri regions.
- ⑥ Regⁿ can also b futuristic for purpose of planning, which prescribes the form that shd exist in future → agro climatic regⁿ by Radhawa, used by ICAR.
 - * Throner's agri regⁿ socio-eco.
- ⑦ based on socio-eco criteria. like typ of land holding, labour supply, topography, mechanisaⁿ levels, credit, marketing, economic orgⁿ of agri.
- ⑧ This is ex of multi-element criteria and used mainly for delineating agri of not so developed regions.
 - * William Ester scheme for agri planning used 17 parameters under 2 categories < " " agro climatic planning
- * ICAR's 1st ranking crop based regⁿ.
- * Crop combinaⁿ regions weaver & mappack. Here dominant + secondary crops are taken together. 5 regions:-
 - (1) rice combinaⁿ reg (2) wheat CR (3) cotton CR (4) Plantⁿ CR (5) Millet CR

inc fruits & spices
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Rice + cotton : telangana
 " + cane : w. plains, carver
 " + pulses : MP
 " + fishery : WB
 " + tea : nilgiris

Rice ① PLFT

[wheat + Mustard, wheat + cane, wheat + cotton, wheat + gram, wheat + exotic.] ②

[cotton + groundnut, cotton + cane, cotton + Millets.] ③

[Plantations] ④

Mostly monocropping : tea estates, coffee, orchards in combi w/ staple crops.

in hills : tea + rice, tea + maize, tea + millets. Rashmir : saffron, rice.

Agro-forestry in w. ghats teak + coffee. can also add turmeric.

[Millets] ⑤

Millets + [rice, cotton, pulses] telangana, daman, MP

Agro-climatic zones ACP

involves concept/ basis/ criteria & describing each region.
 It is a type of agri-regⁿ but futuristic, for planning. It is prescriptive and not descriptive.

Agri-planning : planning for trade, crop planning, food sec, water, rural dev, & rural dev. It also includes planning for rights like forest rights for tribes.

∴ ACP is ex of agri based planning but not sectoral or crop planning alone & explores beyond agri. Agri's imp is asked but planning involves it & other things.

It aims to find non-agri forms that can be practiced with agri crops acc to local resources. ∴ only local resources & used

It is alternative to sectoral planning, a new paradigm to ensure balanced dev of all regions of entry. It ensures sus-dev acc to carrying capacity of local area.

It is accepted by PC, to be best planning approach for reg dev. WS dev becomes part of this scheme.

As agri is India's comparative adv, agri based planning for various fields is must & shudnt b ignored. Agri is basis of livelihood for 70% popn.

It absorbs bulk of rural, unskilled popn.

Agri has highest land use (46%)

Agri related pollun is too imp ecological problem.

∴ Ignoring agri-based planning wud deprive planning of an imp social, economic & ecological component.

Criteria of ACP

- ① based on agri prospects (crop + non-crop) supported by local resources
- ② must not be disruptive.
- ③ based on phy factors of location. (soil, physiography, topography, relief, climate (T, rain), slope, terrain, water, NW.

④ These all factors are under physiography's control. ∴ at macro level ACP is done on base of physiography elements by Randhawa. 5 regions are:- (Macro Regions)

⑤ them a mt complex, N. plains, coastal plains, plateau hills & highlands & islands.
∴ AC regn map has 1:1 correspondence wid physiography map

⑥ At Meso level 5 macro reg are divided on base of rainfall & local topographic features

Himalaya on basis of rain
 eastern (wetter) ①
 western (drier) ②

N. plains on basis of rain
 lower ganga ③
 middle " ④
 upper " ⑤
 trans " ⑥
 W. dry plains (marusthal) ⑦

Plateau on physiography basis
 western hills & plateau ⑧
 eastern " " ⑨
 southern " " ⑩
 W. ghats + W. coastal plains ⑪
 E. " + E. " ⑫

E, W hills
 L M U T D N. plains
 W E S W E plateau
 islands
 gujarat plains
 C. plateau + hills.

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- ⑧ (averalit bundelkhand) (C. upland)
- ⑨ (bhagel, bastar, dandkarnia) (E. upland)
- ⑩ (telangana, maha, dharwad)
- ⑪ (Malabar, Konkan, SHC)
- ⑫ (coromandal, N. circars, shivaroy)
- ⑬ Islands ✓
- ⑭ gujarat plains (khatriwad, sabarmati, nali)
- ⑮ C. plateau + hills (satpura, vindhya + mahwa)

Other ex of A-C regⁿ

only) scheme is not psbl as resources, challenges etc of diff regions vary.

- ② In 1985, PC used a scheme based on physiographic factors but effective implementaⁿ is psbl only when adm criteria is also accommodated so that planned regions do not cross each others boundaries.
- ③ National agri research project (NARP) divides India into 131 regions whr adm boundaries wer incorporated in ACR.
- ④ Another ~~FEAR~~ scheme by ICAR & NBSSLUP stresses on ecological parameters like UW, biodiversity, seasons, soil and divides India into Agro-ecological regions which is better concept than ACR.
- ⑤ ICAR has also recommended a scheme incorporating human aspects like infra, irrigation, crop combi for a practice A-C-Planning.

∴ ACR uses various criteria (physio, rain, adm, ecology, human factors).

Agro-ecological planning Regions

- ① principles same as ACP.
- ② It explicitly involves ecological parameters like biodiversity, indigenous genetic pool, resource quality, ecological probs.

- ③ ICAR gave 8 AERs.

- | | | | | |
|-----|-------------------------|--|-------------------------|-----------|
| (a) | <u>humid</u> | <u>w. himalaya</u> | along with BOB islands. | humid (3) |
| (b) | " | <u>E.</u> | | |
| (c) | " | <u>bengal & assam plains</u> | sub-humid (2) | |
| (d) | <u>sub-humid</u> | <u>sutlej, ganga, alluvial plains</u> | | |
| (e) | " | <u>humid E</u> & <u>S.E uplands</u> | | |
| (f) | <u>Arid</u> | <u>w. plains</u> | arid-semi arid (3) | |
| (g) | <u>semi arid</u> | <u>lava plateau + central highland</u> | | |
| (h) | <u>humid, semi arid</u> | <u>w. ghats + karnataka plateau</u> | | |

hence AER use: physiography, rain, humidity, seasons, characteristic vegⁿ.