

Supplementary S1

Table S1. Change rate of different ecosystem services in 13 counties of Yan'an area from 2000 to 2020.

Location	GAP	FUP	LVP	TBP	CAS	SDR	SWY	HBQ	OR
Baota	-22.98%	2115.75%	-14.44%	-95.84%	7.47%	4.99%	-29.01%	6.30%	7.95%
Yanchang	29.47%	1790.58%	121.90%	-14.85%	13.60%	4.94%	-26.59%	10.09%	17.51%
Yanchuan	-63.13%	13524.73%	-15.08%	-75.37%	23.66%	6.21%	-11.57%	9.24%	47.87%
Zichang	-63.65%	8361.85%	-42.03%	-94.54%	43.93%	6.92%	-15.84%	10.92%	115.26%
Ansai	-35.55%	188.32%	20.12%	-94.73%	30.88%	7.67%	-43.52%	12.14%	91.80%
Zhidan	27.48%	1783.06%	12.07%	353.69%	12.03%	7.73%	-46.60%	8.27%	17.24%
Wuqi	15.96%	1793.83%	-0.14%	-99.56%	18.30%	7.72%	-26.76%	5.34%	83.94%
Ganquan	35.91%	213.99%	104.21%	-67.45%	0.49%	0.11%	-61.31%	1.69%	-0.75%
Fu	-29.68%	4962.46%	-47.75%	94.87%	-0.30%	-0.07%	-52.00%	-1.32%	0.43%
Luochuan	26.81%	825.05%	206.58%	-90.62%	1.07%	5.23%	-14.34%	-0.53%	2.39%
Yichuan	-40.70%	3680.59%	7.47%	-76.18%	1.01%	0.23%	-22.70%	3.14%	0.05%
Huanglong	44.81%	2166.23%	-34.47%	-98.37%	0.35%	0.00%	-30.95%	-0.16%	0.59%
Huangling	61.82%	1942.09%	5.62%	-95.28%	-0.37%	0.17%	-11.02%	-1.76%	-0.05%

Source¹

¹ Chen, H., Fleskens, L., Baartman, J., Wang, F., Moolenaar, S., & Ritsema, C. (2020). Impacts of land use change and climatic effects on streamflow in the Chinese Loess Plateau: A meta-analysis. *Science of the Total Environment*, 703, 134989. <https://doi.org/10.1016/j.scitotenv.2019.134989>

Supplementary S2

Questionnaire of farmer's perception on GGP implementation

A. Information of household GGP

A1. Did your family participate the GGP?

- a. Yes b. No

B2. Your household major income before GGP:

- a. Cultivation b. Others

A3. Year of GGP participation_____, type of the restored forest:

- a. Ecological forest b. economic forest. please specify the species_____

A4. Your household total cultivation land area _____Chinese mu, the GGP restored land area_____ Chinese mu, the slope angle of restored land:

- a. Flat land b. < 15° c. 15-25° d.>25°

A5. The amount of GGP subsidy you received is _____RMB/Chinese mu/year, the duration of subsidy is_____ years. Did you receive all the promised subsidy?

- a. All received b. partly received c. Not received

A6. The survival rate of your restored GGP forest?

- a. Above 90% b. 70-90% c. 50-70% d. 30-50% e. below 30%

A7. Have you be required to maintain and re-plant the GGP forest?

- a. Yes b. No

A8. How many hours did you spend to main the forest _____hrs/year, do you agree the maintain work is heavy?

- a. strongly agree b. agree c. neutral d. disagree e. strongly disagree
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B. Willingness to participate

B1. Do you agree government force you to participate the GGP?

- a. strongly agree b. agree c. neutral d. disagree e. strongly disagree

B2. Do you support the implementation of GGP?

- a. strongly support b. support c. neutral d. oppose e. strongly oppose

B3. Why do you support/oppose the current GGP?

B4. How do you consider the current subsidy standard?

- a. very low b. low c. neutral d. high e. very high

B5. How do you consider the current restored tree species?

- a. very satisfied b. satisfied c. neutral d. unsatisfied e. very unsatisfied

Your preference of restoration tree species: _____.

B6. Do you agree the maintain work of restoration forest is heavy?

- a. very heavy b. heavy c. neutral d. easy e. very easy

B7. Do you support the next round of GGP in the future?

- a. strongly support b. support c. neutral d. oppose e. strongly oppose

B8. Why do you support/oppose the future GGP?

B9. What changes do you expect for future GGP?

- a. Increase the GGP forest land area
b. Increase the GGP subsidy standard
c. Flexibility on choosing the restore forest species
d. Improve technical support on tree planting
e. No change expected
f. Other_____

B10. If GGP stop and no more subsidy provide in the future, will you consider re-cultivation on the restored forest?

a. Yes b. No

Please specify your opinion toward the below statements

	Strongly increase /Agree	Increase /Agree	neutral	Decrease /Disagree	Strongly decrease /Disagree
B11. Relation between GGP and my environmental protection awareness					
B12. Relation between GGP and job opportunities of local people					
B13. The governmental is of a high efficiency of GGP implementation					
B14. Relation between GGP and local tourism industry development					
B15. Relation between GGP and my household cohesion with other village members					

C. Perception of GGP impacts on ecosystem services

Please specify your opinion toward the below statements

	Strongly increase	increase	neutral	decrease	Strongly decrease
C1. Impacts of GGP on your household grain production					
C2. Impacts of GGP on your household fruit production					
C3. Impacts of GGP on your household livestock number					
C4. Impacts of GGP on your household timber availability					
C5. Impacts of GGP on local sandstorm weather					
C6. Impacts of GGP on local soil and water lost					
C7. Impacts of GGP on local landslides hazards					
C8. Impacts of GGP on local river water quantity					
C9. Impacts of GGP on local river water quality					
C10. Impacts of GGP on local vegetation cover					
C11. Impacts of GGP on local wild animal number					
C12. Impacts of GGP on local habitat quality					
C13. Impacts of GGP on local tourism number					

D. Farmer's behavior and economic impacts

D1. Do you think the participation of GGP bring more free time to the household labour?

a. Yes b. No

D2. Do you think the participation of GGP caused the out-migration for work of the household labour?

- a. Yes b. No

D3. Do you think the participation of GGP cause the land abandon to your family?

- a. Yes b. No

D4. Do you agree GGP implementation had increased your household income?

- a. strongly agree b. agree c. neutral d. disagree e. strongly disagree

D5. Compare to the time before GGP implementation, the income you obtained from the land had approximately increased/decreased _____ RMB/year

D6. What do you think is the biggest impacts of GGP on your household family?

- a. Change of household income b. Farming habit
c. Living habit d. Surrounding ecological environment
e. No impacts f. Other _____
-

E. Basic information

E1. Gender: _____.

E2. Age: _____.

E3. Years of education: _____.

E4. Householder number: _____, adult male number: _____.

E5. Village location: _____, years of living in this area: _____.

E6. Your main household income source:

- a. Cultivation (_____) b. other (_____)

E7. Your household family income:

- a. Below 1000 RMB b. 1000 – 3000 RMB c. 3000 – 5000 RMB
d. 5000 – 10,000 RMB e. 10,000 – 20,000 RMB f. above 20,000RMB

Notes:

Supplementary S3

Questionnaire of stakeholder's perception on GGP implementation

A. Perceptions on GGP

A1. Explain your knowledge on the current GGP policy:

- a. Extremely understand
- b. Normal understand
- c. Somehow understand
- d. Not understand

A2. Do you agree the implementation of GGP had influences to your life?

- a. strongly agree b. agree c. neutral d. disagree e. strongly disagree

A3. Do you support the implementation of GGP?

- b. strongly support b. support c. neutral d. oppose e. strongly oppose

A4. Why do you support/oppose the GGP implementation:

A6. Do you support the next round of GGP in the future?

- b. strongly support b. support c. neutral d. oppose e. strongly oppose

A7. Please specify the reason of your agreement/disagreement to next round of GGP

A8. What changes do you expect for future GGP?

- g. Increase the GGP forest land area
- h. decrease the GGP forest land area
- i. change the restore forest species
- j. Improve subsidy for farmers
- k. No change expected
- l. Other_____

Please specify your opinion toward the below statements

	Strongly increase /Agree	Increase /Agree	neutral	Decrease /Disagree	Strongly decrease /Disagree
B11. Impacts of GGP on my environmental protection awareness					
B12. Impacts of GGP on local job opportunities					
B13.The governmental is of a high efficiency of GGP implementation					
B14. Impacts of GGP on local tourism industry development					
B15. Impacts of GGP on local population outmigration					
Impacts of GGP on local economic development					
Impacts of GGP on local farmer land abandon					

B. Perception of GGP impacts on ecosystem services

Please specify your opinion toward the below statements

	Strongly increase	increase	neutral	decrease	Strongly decrease
C1. Impacts of GGP on local grain production					
C2. Impacts of GGP on local fruit production					
C3. Impacts of GGP on local livestock number					
C4. Impacts of GGP on local timber availability					
C5. Impacts of GGP on local sandstorm weather					
C6. Impacts of GGP on local soil and water lost					
C7. Impacts of GGP on local landslides hazards					
C8. Impacts of GGP on local river water quantity					
C9. Impacts of GGP on local river water quality					
C10. Impacts of GGP on local vegetation cover					
C11. Impacts of GGP on local wild animal number					
C12. Impacts of GGP on local habitat quality					
C13. Impacts of GGP on local tourism number					

C. Basic information

C1. Your gender: a. Male b. Female

C2. Age: _____, Education level: _____.

C4. Living area: _____ county _____ town _____ village.

C5. Your occupation:

a. Governmental officer

b. Citizen

c. Tourism practitioner

d. Forestry practitioner e. Other_____

E7. Your household family income:

- | | | |
|----------------------|------------------------|--------------------|
| b. Below 1000 RMB | b. 1000 – 3000 RMB | c. 3000 – 5000 RMB |
| d. 5000 – 10,000 RMB | e. 10,000 – 20,000 RMB | f. above 20,000RMB |

Note:

Supplementary 4



Figure S1. Landscape of the research area and farmer in the restored forest, photoed by H.Chen, with permission from the farmer of phtotgraph and utilization for scientific purpose.