CHAPTER 4

SITE SELECTION AND "SAWAH" SYSTEM DESIGN

Site selection for Sawah system development is very vital and plays a key role in effective Sawah establishment for effective and sustained rice production. Careful consideration of site selection is thoughtfully advised

Site Selection Skills

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Identifying suitable lowlands (valleys, flood plains etc.) for sawah system development is a key step. Several factors may be considered during site selected but these would vary depending on prevailing conditions and circumstances.

Most common factors to consider but not limited to include the following:

a. Water sources & quality: (>10 L/s, > 5 months/year) Stream/River, Spring, Seepage, Flood, Rain-fed

b. Topography and soil: Ongoing & potential rice area > 10ha, Slope < 1-2%, surface roughness, Soil texture, Soil fertility, surface roughness, Soil texture, Soil fertility

c. Socio-economics: Strong will, market access, road access in case of demonstration, land tenure, secured rent

NB:
(i) Collaboration between farmers, scientists, engineers, and extension staff is very essential at demonstration stage

(ii) Farmers know best, local and site specific hydrological conditions of any area in which they operate. This is very critical and very important for site selection

SKILLS FOR SITE SELECTION CON'T

1. Ongoing and potential lowland rice areas are larger than 10ha within walking distance of a core site. The core site can include various sub- sites with 0.5-10ha or more rice area.

2. Secured continuous water flow: > 5months, base water discharge: > 20l/sec, i.e., > 1500-2000m^3/day, potential irrigated *sawah* area: > 10-20 ha,

3. No strong flood attack: Flood depth will be < 50cm and continuation of the flood will be < 3-4days, Flood water discharge will be < 10 ton/sec

4. Flat and very gentle slope: < 2%, if slope is < 0-1%, levelling operation is easy.

5. Strong will of rice farmers to master *sawah* technology skills and *sawah* development by farmers' self support efforts

6. Intensive hearing from rice farmers on the local hydrological conditions for past 10-15 years is important.

SKILLS FOR 'SAWAH' SYSTEM DESIGN

1. *Sawah* layout and total potential area, shape and size of 'sawah', water intake and distribution are critical factors. Common examples of water sources and distribution methods include:
   (i) Spring and from 'sawah' to 'sawah',
   (ii) spring and diversion canal,
   (iii) Stream/seepage, (iv) Simple dyke and diversion canal,
   (v) Fish pond, dam, lake, Weir and Canal and (vi) Pump irrigation
2. Interceptor canal, Contour bund system
3. Flood control by drainage or dam
4. Drought control by pond/water-harvest
5. Soil movement and quality of leveling
6. Bund layout and quality

NB:

Successful examples of Sawah system design suitable for the various ecologies include:

(1) Type of oasis in floodplain (Sudan savanna zone)

(2) Pump irrigation system (all climatic zone)

(3) Irrigation with dyke on small river (Guinea savanna zone, forest/transition zone, forest zone)

SURVEY AND MAPPING

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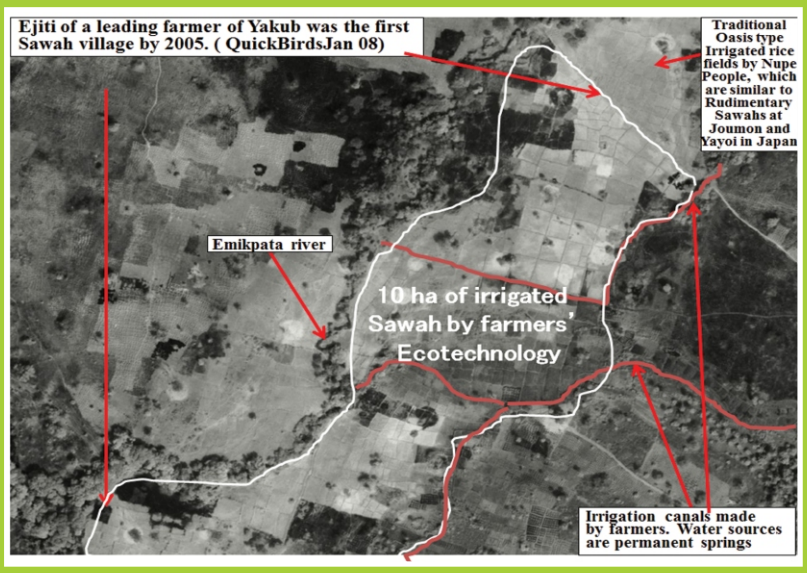
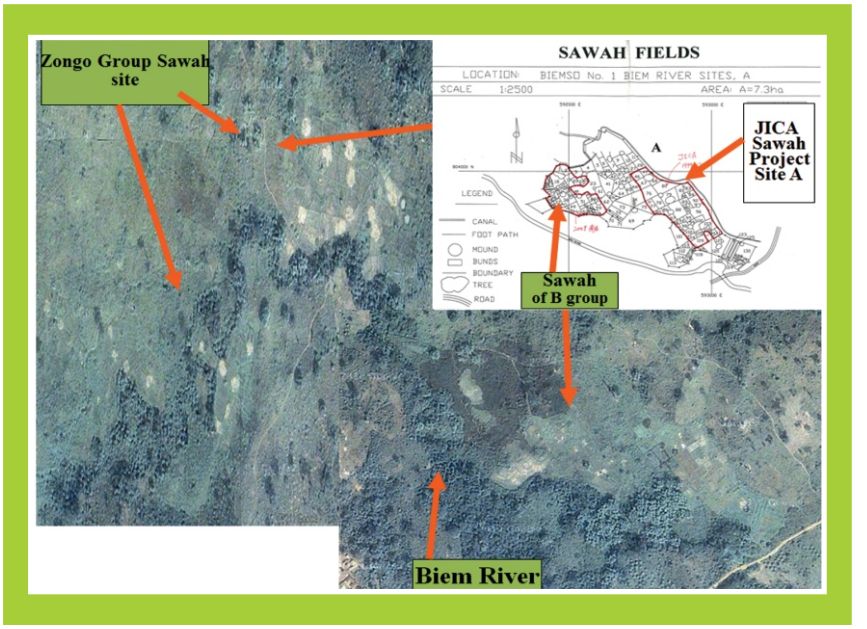
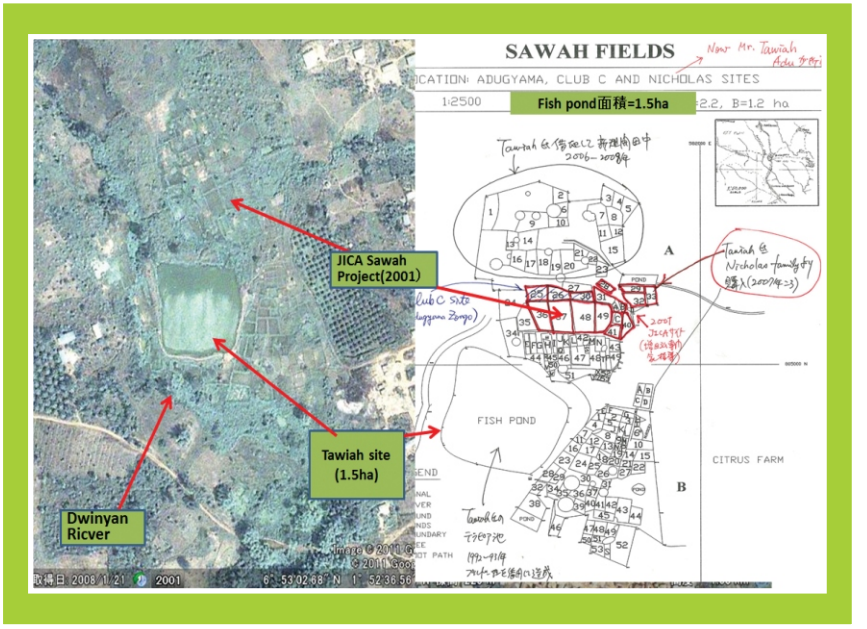
Existing satellite maps or surveys if available can helps to early identify or locate watershed water and water sources



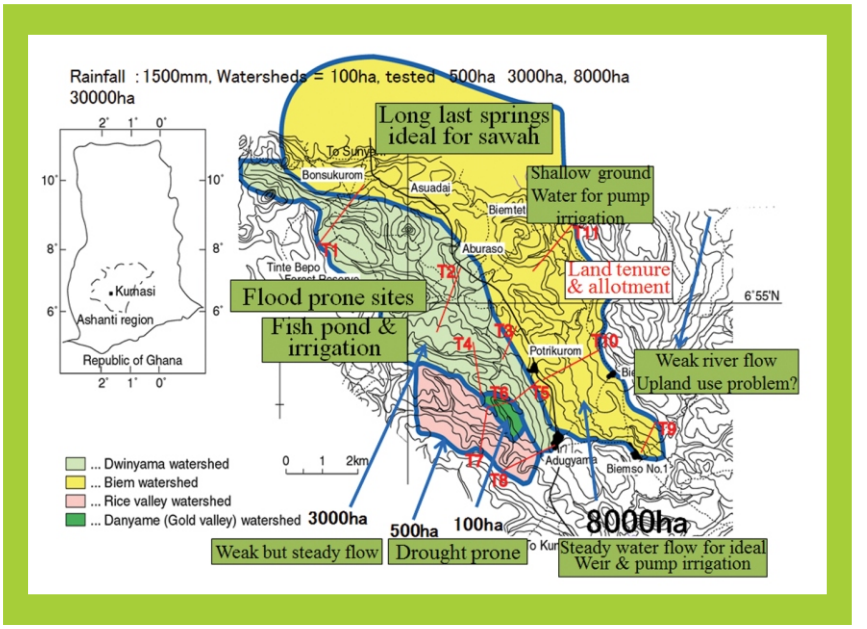
Quick Bird Image of the Ejiti Sawah Village, Bida, Nigeria. Permanent spring water sources identified along the Emikpata river



A satellite map of the Mankran watershed in Ashanti. Ghana showing suitable sites along the Biem river that have been developed into Sawah systems



A sitelite map of the Mankran watershed in Ashanti. Ghana showing suitable sites along the Dwinyam river that have been developed into Sawah system.



Mankran watershed showing different valley types/forms. Farmer based Site Specific Sawah Development and Management through On-The-Job Training are key (Sawah project phase I) in Ghana

Expanded photo of numerous small Oasis type pump irrigated fields in Nigeria.

Sokoto-Birnin Kebbi flood plain in Nigeria, Google 2007

It may be good (but not a necessity) to have a topo-survey of a site

It may be necessary to physically walk through the area to acertain prevailing conditions on the ground

Where a proper survey has to be done, transect lines will be cut and citing poles used

Simple survey tools may be used to establish co-ordinates and proper geographical location of site

The type of system design for any particular valley is greatly influenced by ;

1. **The type of water source (spring, weir & canal, etc) and**

2. **The physical nature of the valley (wet, dry, wide, narrow, etc).**

Restoration measure to connect spring water and Sawah by irrigation canal and syphon pipes at Adugyama, Mr. Tawiah's site. August 2011. This site was destroyed by IVRDP through poor knowledge of Sawah system development.

Mr. Tawiah trained another farmer to develop 3ha of sawah using small spring water source at Adugyama in Ghana. Only local farmers know much about such water sources.

A strong spring source can irrigate large areas of land in a season as in Dwinyama, Ghana

Water source could be a small stream with several springs along both banks. Such combination can provide enough water for sawah rice cultivation in Ghana.

Rice growing in a narrow but long valley that relies on a small stream supported by several spring sources

Natural ponds that have a high recharging capacity can be useful sources of water

Al contained in spring water can, however, result in poor rice growth as experienced in Bida, Nigeria.

Photo. 3-25. Compaction to create impermeable layer on the front of dyke, March 2000

Photo. 3-23. Excavation of river bottom and jute bags

Photo. 3-26. Dyke was covered with sand bags after compaction of permeable layer

Photo. 3-17. Flooding over dyke

A dyke can be constructed over stream and water harvested for sawah rice cultivation. (e.g. JICA/CSIR Sawah project in Ghana)

Sand bag and Wooden Weir, construction through farmers' self-support management in Ghana (1999)

Sand bag weir by farmers and SRI Sawah team, Aug.2009, Asuodei, Ghana

Canal construction by participating farmers indicates the commitments of farmers towards Sawah System Development.

Bigger water sources such as rivers can be partially intercepted and water harvested for use as in Nigeria.

Fadama III Sawah Demonstration site, 40km south from Gwagwalada along Abuja Lokoja road, (Upper - 25 Feb 2011, Lower - 2 May 2010).

Flood plain and pump

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Flood plains are relatively flat areas where variable water harvesting methods needs to be adapted.

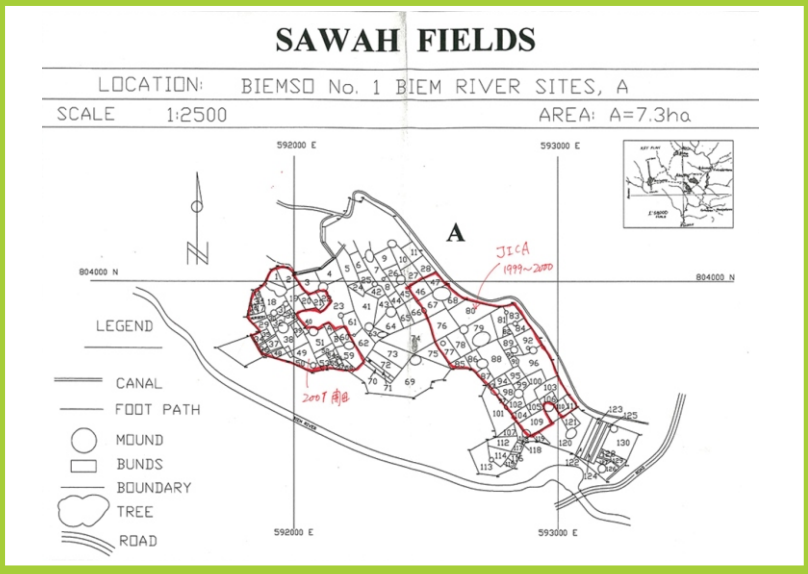
Small pond may be constructed by farmers, when necessary for water to irrigate (e. g. Kodadwen, Ghana)

Small dams constructed for water storage in the dry regions can be used to irrigate rice and source of water for animals

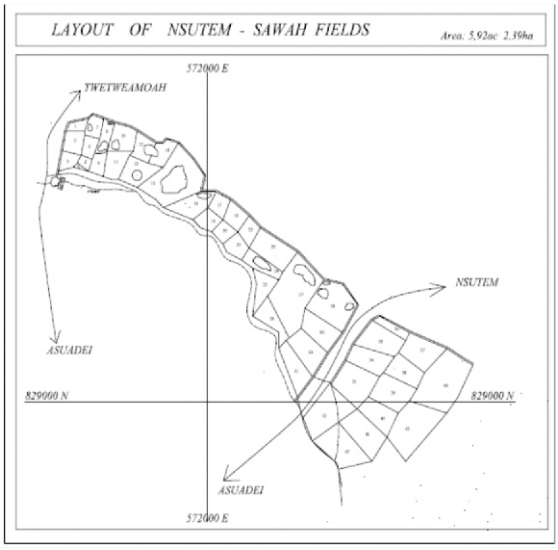
A pump lifting water from a pond onto a rice field at a site in Nigeria

Oasis type pump irrigated rice and vegetable fields under poor water use efficiency and weedy rice field before Sawah technology was introduced at Kebbi, Nigeria

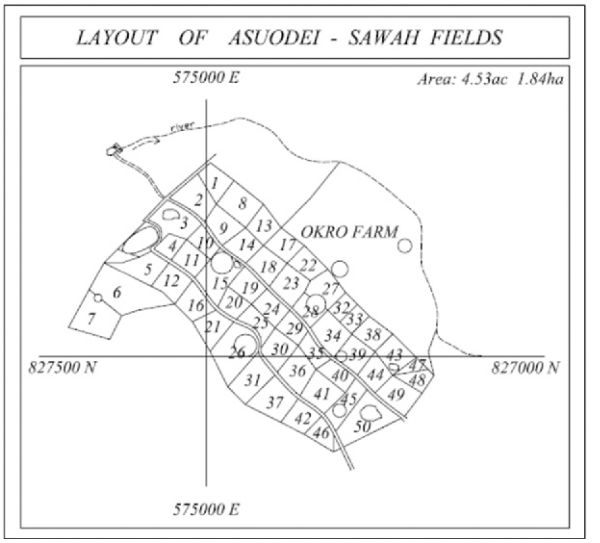
EXAMPLES OF SAWAH FIELD LAYOUTS AS INFLUENCED BY LOWLAND TYPE, WIDTH OF LOWLAND AND EXISTING PHYSICAL CONDITIONS



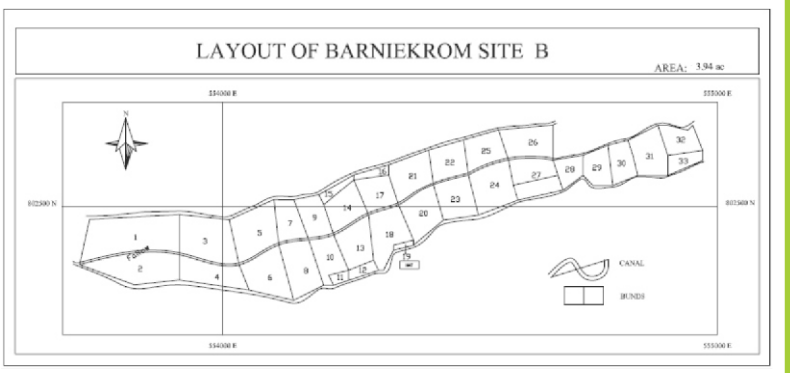
Layout of several fields along a meandering valley of the Biem river in Ghana



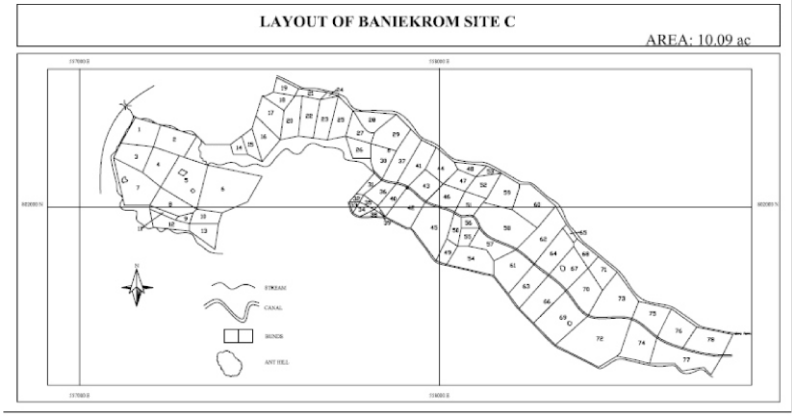
Field layout of a valley that harvest water from bridges on roads that cut across Several portions of the valley



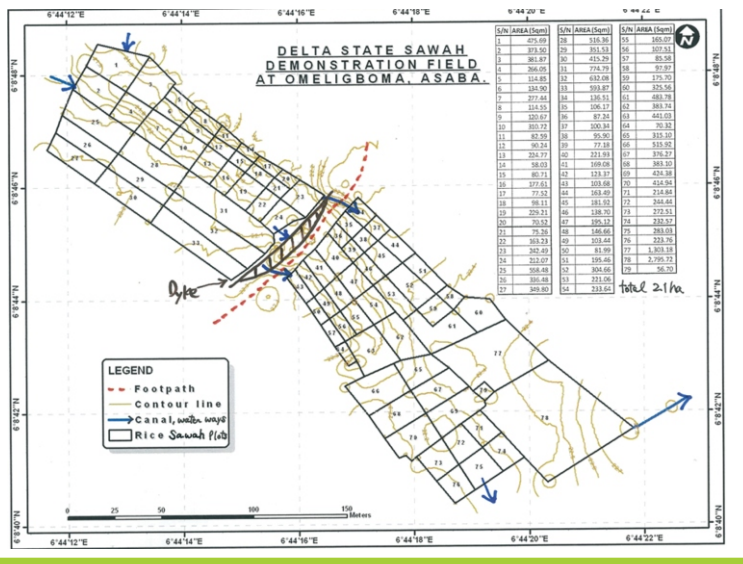
Field layout of a short but relatively wide valley that lies off the main water Source (river/stream) at Asuodei in Ghana



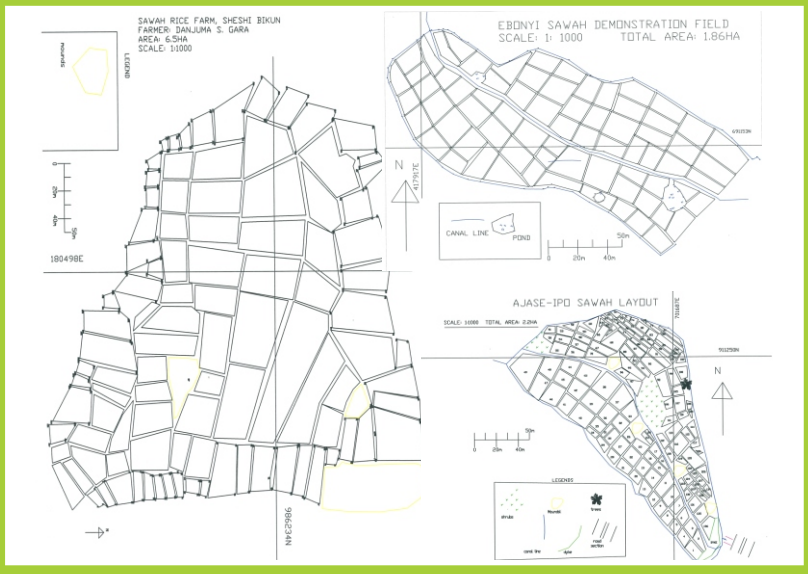
Upper portion of field layout of a long and narrow valley in Baniekrom In the Ashanti region of Ghana



Field layout for the lower portion of a long but narrow valley at Baniekrom in Ashanti region of Ghana



Sawah demonstration field (flood plain) at Asaba in the Delta State of Nigeria



Ebonyi state sawah demontration field (a wide flood plain) in Nigeria

Rehabilitation of degraded irrigation system

Sawah technology can renovate abandoned pump irrigation fields (eg. Lagos State in Nigeria)

Other but costly conventional irrigated development system involving expensive materials are not cost effective and difficult to manage by farmers

A large and abundant dam that is not beneficial to the farmer. Such development project are not sustainable and have no direct benefit to farmers.

Large irrigation sites where farmer water management and water use-efficiency are very poor