

# Poverty Alleviation and Conservation Advocacy with Butterfly Farming as an Economic Incentive

Village of Tundu, Morogoro Region, Kilosa District, Tanzania



(Weir 2010)



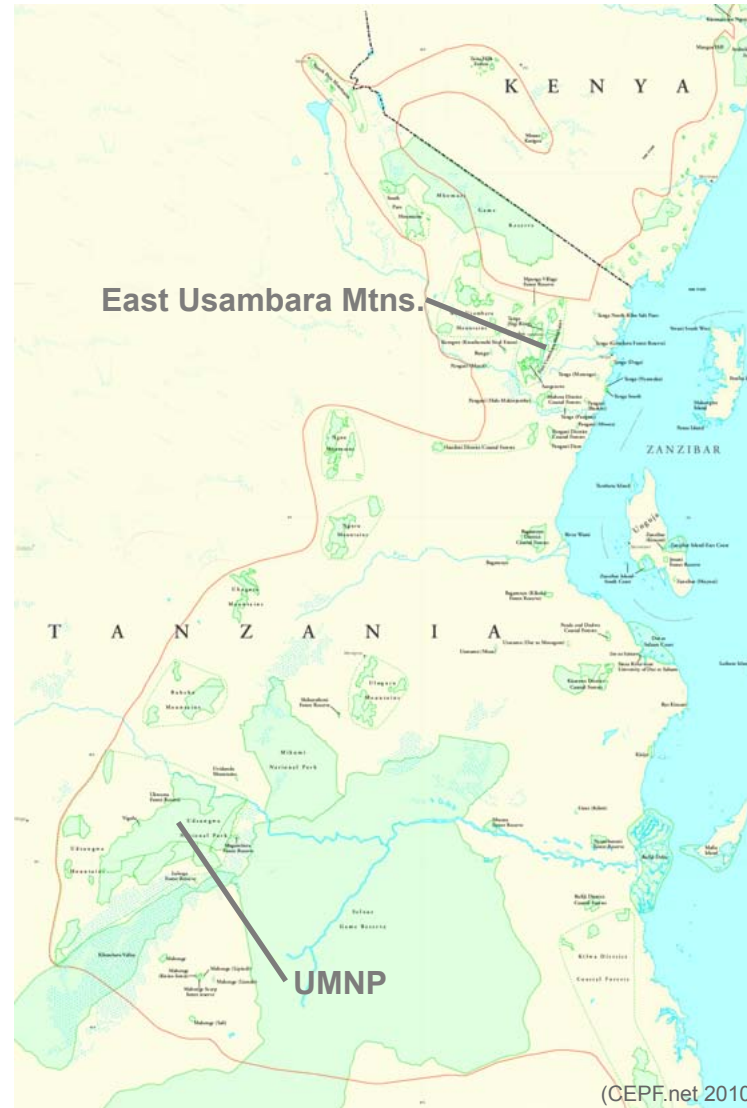
# Tundu's conservation and development: environmental pressures + socio-economic challenges

Unfortunately, lacking economic resources typically result in the unsustainable exploitation of wood resources and thus environmental degradation, as evidenced by the forests of the Eastern Arc Mountains (EAM) on the western side of Tundu. Firewood collection, charcoal making, agricultural cultivation, and tree/pole timbering, as well as hunting, human-set wildfires, and livestock grazing encroach upon forests, abuse wood resources, destroy habitats, and damage canopy cover. This compromises biodiversity and threatens the EAM's unique endemic faunal species (i.e. primates, birds, chameleons, frogs, and insects).

Environmental implications are compounded by a lack of economic diversification in Tundu. Many of the rural village's 4,000 residents pursue the same economic gains by selling cash crops such as sugar cane, rice, beans, cassava, and potatoes.

The Critical Ecosystem Partnership Fund, among others, promotes nature-based sustainable businesses (i.e. beetle harvesting, organic honey, medicinal plants, and raw silk). They support the notion that a "double-pronged approach, i.e. conservation and poverty alleviation through sale of outcomes of conservation activities" can benefit local economies and conservation efforts alike (Kikula et al. 2003, 34).

With the support of the village council and aid of an NGO, butterfly farming as a sustainable nature-based business and economic alternative is a realistic possibility for Tundu. Because butterfly farming necessitates natural ecosystem, this project also encompasses ecological conservation, forest regeneration, and socio-economic challenges.



(Weir 2010)  
Increasing growth rates, rising birth rates, and immigration increase environmental and development pressures on the EAM forests.



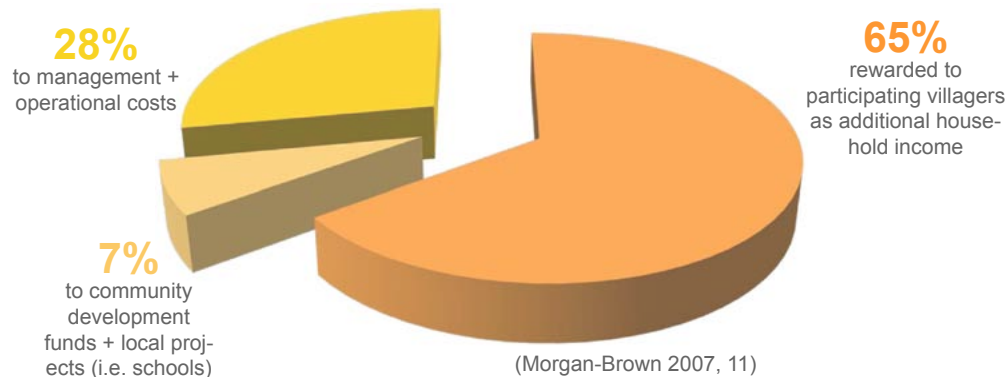
(Weir 2010)  
Nature-based sustainable businesses provide an income opportunity, which could be utilized for constructing one's own residential structures.

# economic incentives and conservation improvement

The Amani Butterfly Project (ABP) enables “400 rural Tanzanians from six villages in the East Usambara Mountains farm and market native butterflies.” The mission of ABP is to “reduce poverty and create incentive for forest conservation” by educating rural villagers how to farm native butterflies. (Amani Butterfly Project, n.d.).

ABP educates butterfly farmers about harvesting techniques, marketing, export, financial management, and conservation efforts. This enables villagers to harvest butterfly pupae to be sold (by ABP representatives) to butterfly exhibits in the United States and Europe.

## Distribution of ABP Sales



**\$90,000 USD** ...generated by six villages in the East Usambara Mountains in 2008 (Amani Butterfly Project, n.d.)

...eggs laid by female butterflies in her lifetime, which can be sold for \$1-2.50 USD (Amani Butterfly Project, n.d.).

**250-500 X \$1-2.50**

...annual average earnings of a butterfly farming participant under the supervision of ABP (Morgan-Brown 2003, 29).

**135,000 TSh**

...amount spent annually on pupae by some United States butterfly exhibits (Black et al. 2001).

**\$100,000 USD**

**20%** ...percent of increased income earned by average butterfly farming participants (Morgan-Brown 2007, 11).

...percent of ABP butterfly farmers who are women. (Morgan-Brown 2007, 33).

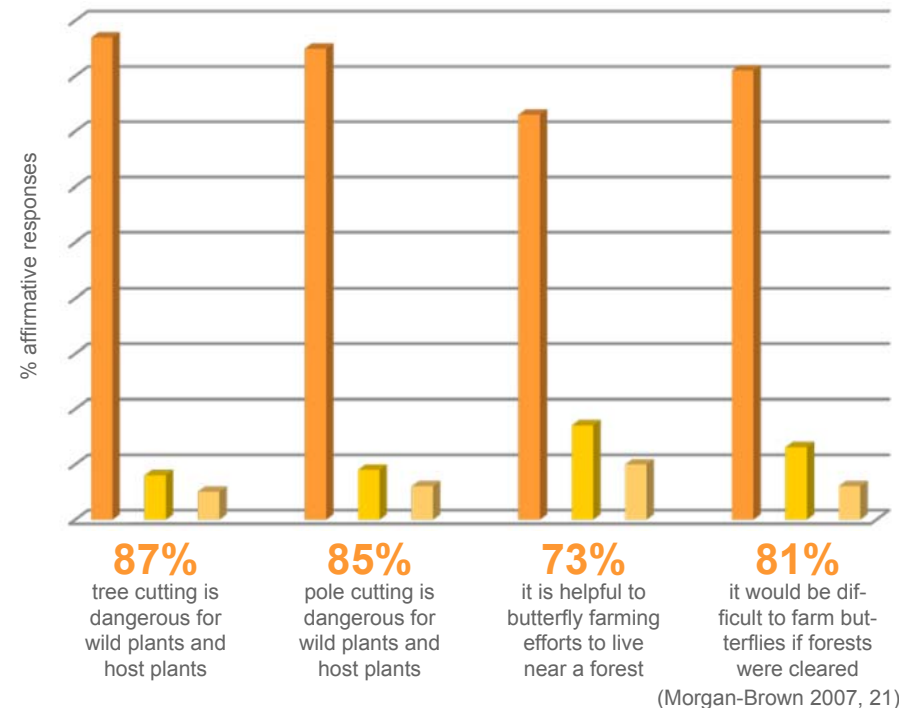
**55%**

...percent of butterfly farmers reporting that the capital generated enables them to send their children to secondary school (Morgan-Brown 2007, 33).

**20%**

Butterfly farming also benefits conservation efforts. Butterfly farmers only need to catch about a half dozen wild butterflies each year, but this provides enough economic incentive to protect previously-disturbed forests. Consequently, butterfly farmers are more concerned about forest conservation and more likely to participate in conservation activities, as evidenced by a 2007 study conducted by ABP of 150 butterfly farmers.

## Conservation Attitudes and Practices Displayed by Participating Butterfly Farmers



Butterfly farmers are especially concerned of environmental issues and illegal forest activities that compete with their ability to generate capital gains. The participating villages of Msasa and Kwezitu experienced an increase in forest conservation behaviors:

- membership and participation in village environmental committees and activities
- planting non-timber and timber trees on household and village lands
- discouraging/reporting illegal cutting in protected forests
- preserving natural forest on household land (Morgan-Brown 2007, 22).

Furthermore, butterfly farmers “stopped destructive firewood cutting, organized a tree planting campaign, and secured village forest reserves” (Morgan-Brown 2007, 33). Tundu may consider harvesting wood plots (for firewood and charcoal) to more easily conserve natural areas while promoting butterfly farming.



# butterfly cages + equipment + species + considerations

Male and female butterflies are placed in cages that recreate natural habitats and encourage reproduction. Eggs are laid on host plants and develop into pupae. Several netting options are available, all featuring similar materials (bamboo, netting) and sizes (2 meter height and 4 meter width (Morgan-Brown 2003, 21-22).

## shade net flying cage

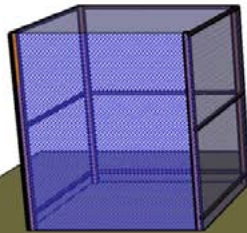
30,000 TSh; best recreates preferred shade and humid environment; poles are planted with live seedlings that sprout and provide additional vegetation; lasts approximately 5 years



(Amani Butterfly Project)

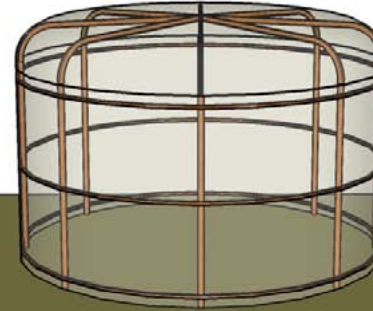
## mosquito net cage

costs 3,000 TSh each; limited shade provided, lessening butterfly activity and egg output



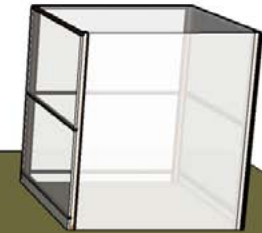
## clear plastic cage

increases internal humidity and temperature; wasp- and ant-proof; ideal for cool and rainy weather; lasts 2-5 years; 15,000 TSh



## thin white cloth cage

durable and thick enough to ensure undesirable insects and ants cannot enter while still allowing sunlight to penetrate; 8000 TSh



Low-cost equipment (such as planting bags, hanging traps, and sweep nets) is crucial for successful butterfly farming. Sales, packaging, and shipping are coordinated by an NGO. When choosing specific species to harvest, several important considerations become clear:

### 1 altitude

Altitudinal range ensures butterfly diversity, but the most ideal range is 800-1000m ASL. This approximate range can be found around Tundu.

### 2 pupae period length

Not all of Udzungwa Mountain's 250 butterflies can be farmed. If butterfly's pupae period is too short, they cannot be shipped (3-4 day process), as they may hatch while packaged.

### 3 price + market

African butterflies are in higher demand than species in any other areas of the world (Slone 1997). However, it is not always advisable to farm species that are in high abundance as they sell for lower prices.

### 4 humid microclimate

Ideally, cages are located near streams and surrounded by natural vegetation (outside and within cage). Farming during the dry season requires watering of the host plants to maintain ideal humidity conditions.

farmable species in Tundu area	available at low elevation	good market	long pupae life	high price	possible foodplant	comments
<i>Acrae aganice</i>	x				<i>Adenia spp.</i>	short pupae length
<i>Amauris albimaculata</i>	x				<i>Asclepiadaceae family</i>	very short pupae length
<i>Amauris niavius</i>	x				<i>Asclepiadaceae family</i>	very short pupae length
<i>Charaxes candiope</i>	x		x		<i>Croton spp.</i>	not very popular
<i>Charaxes cithaeron</i>	x		x		many species	not very popular
<i>Charaxes varanes</i>	x		x		<i>Allophylus spp.</i>	not very popular
<i>Cymothoe aurivillii</i>		x			<i>Rawsonia spp.</i>	short pupae length
<i>Danau formosa</i>	x	x			<i>Asclepiadaceae family</i>	short pupae length
<i>Danaus chrysippus</i>	x	x			<i>Asclepiadaceae family</i>	very short pupae length
<i>Euxanthe tiberius</i>		x	x	x	<i>Dienbolia spp.</i>	
<i>Graphium anglonus</i>	x	x	x		<i>Annona senegalensis</i>	
<i>Graphium colonna</i>	x	x	x	x	<i>Annonaceae family</i>	ideal species to farm at Tundu
<i>Graphium policeses</i>	x	x	x	x	<i>Annonaceae family</i>	
<i>Hypolimnas anthedon</i>	x				<i>Urera spp. Or Laportia spp.</i>	
<i>Papilio dardanus</i>	x	x	x	x	<i>Vepris (Teclean) spp.</i>	
<i>Papilio demodocus</i>	x				<i>citrus</i>	
<i>Papilio desmondi</i>	x	x	x	x	<i>Vepris (Teclean) spp.</i>	ideal species to farm at Tundu
<i>Papilio fulleborni</i>		x	x	x	<i>Clausdna</i>	found at high elevations
<i>Papilio nireus</i>	x	x	x		<i>Toddalia and citrus</i>	
<i>Papilio ophidicephalus</i>	x	x	x	x	<i>Zanthoxylum spp. and Clausena</i>	typically found along rivers in forests
<i>Papilio pelodorus</i>		x	x	x	<i>Cryptocarya liebertiana</i>	difficult to farm and find
<i>Papilio phorcas</i>		x	x	x	<i>Vepris (Teclean) spp.</i>	found at very high elevations
<i>Salamis parhassus</i>	x	x			<i>Acanthaceae family</i>	
<i>Salamis temora</i>	x	x		x	<i>Acanthaceae family</i>	

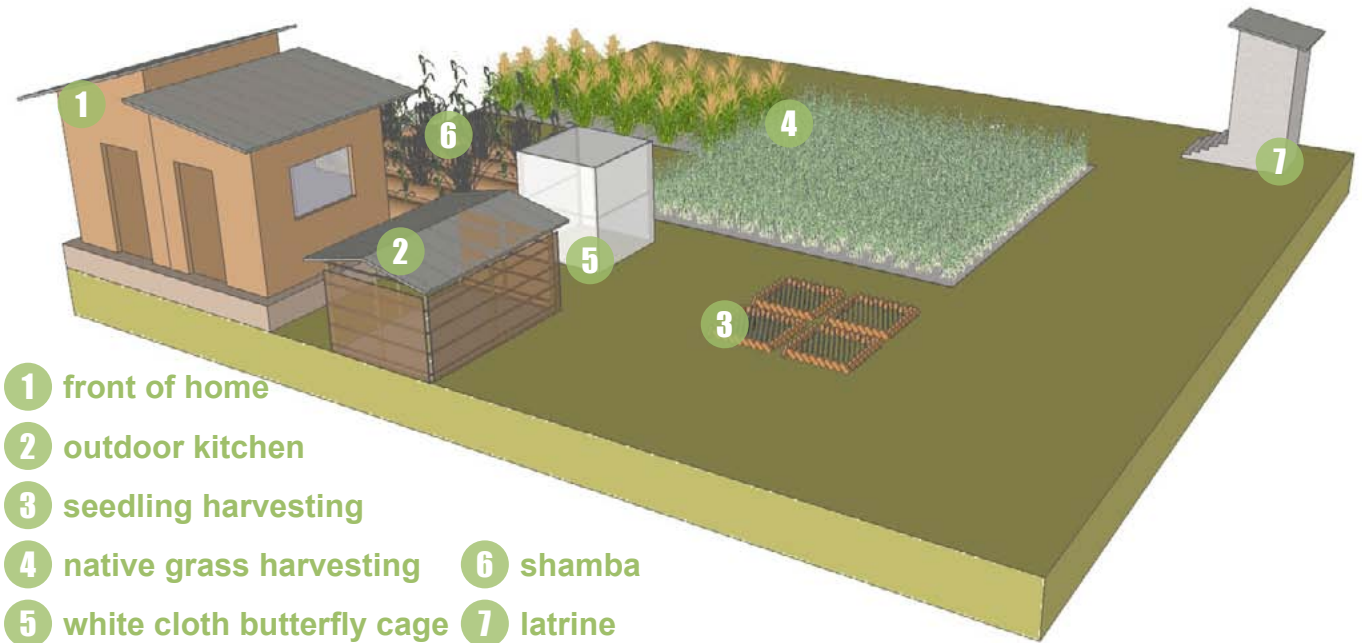
(Morgan-Brown 2010)

# conceptual residential designs

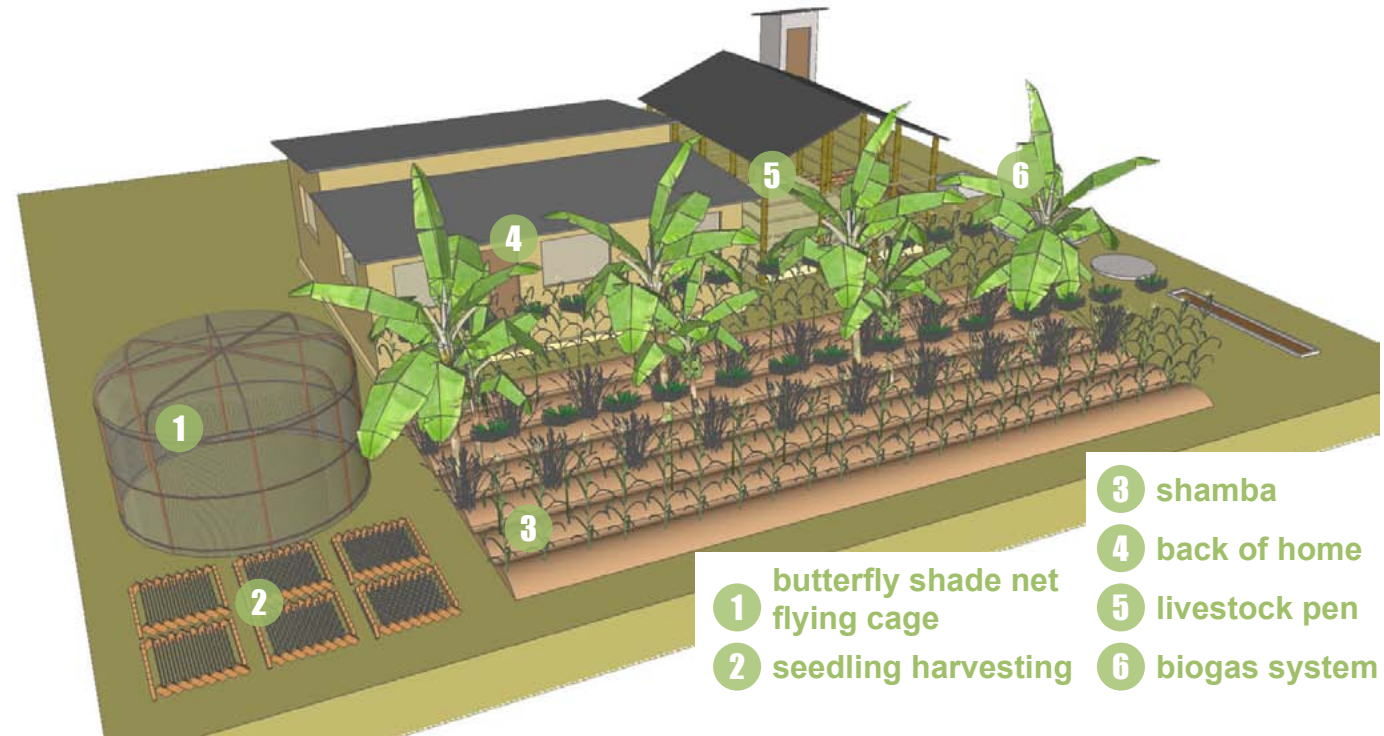
Butterfly farming as a secondary income requires about four days work each month and the extra capital generated provides opportunities for household improvements (Morgan-Brown 2003, 32). The designs provide insight into how butterfly farming may be implemented in a rural setting against customary household structures and activities. Plot sizes are 400 square meters to increase density to the highest standards of Tanzania's planning guidelines (Town and Country Planning 2003). Both designs demonstrate increased environmental stewardship and economic flexibility via butterfly farming.

**Conceptual residential design #1** displays economic diversification via butterfly farming. This household is provided with the capital to harvest seedlings and manage a small shamba. The butterfly cage should be situated to maximize sunlight. This family can also harvest grasses (another nature-based sustainable business), which can be sold or traded with other households. This cohesive relationship benefits both households, and is a result of butterfly farming as a second income.

**Conceptual residential design #2** is a family with a higher income. Butterfly farming enables this family to manage a larger shamba (for subsistence and/or cash crops). Seedlings of butterfly-attracting plants are grown and can be used within the butterfly cage or sold. The economic gains also enable this family to manage livestock which provide energy via a biogas system. Biogas releases this family from the necessity of collecting firewood, charcoal, and other wood resources. Additionally, refined manure is an output of the biogas system, which provides an exceptional fertilizer for the shamba. Conceptual residential design #1 can trade or sell grasses (for the livestock) in exchange for manure (for the shamba).



- 1 front of home
- 2 outdoor kitchen
- 3 seedling harvesting
- 4 native grass harvesting
- 5 white cloth butterfly cage
- 6 shamba
- 7 latrine



- 1 butterfly shade net flying cage
- 2 seedling harvesting
- 3 shamba
- 4 back of home
- 5 livestock pen
- 6 biogas system

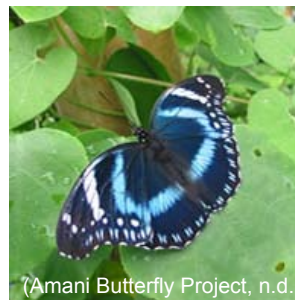


# conclusions + recommendations

ABP demonstrates how government agencies, NGOs, and local communities can collectively progress towards solutions regarding poverty and conservation. With the training and monitoring from ABP, significant positive results have already occurred in six villages near the East Usambara Mountains. Household incomes increased by an average 20% and benefitted more than 400 participating households. ABP demonstrates how large-scale issues can be addressed by simply introducing butterfly farming as a small-scale solution that serves as an alternative means of generating personal income.

If interested in pursuing butterfly farming, Tundu must first acknowledge and respond to several recommendations before experiencing any success similar to the six villages in the East Usambara Mountains.

- 1 appoint village leadership and community representation
- 2 contact government agencies and NGOs such as TFCG and ABP
- 3 conduct stakeholder and community workshops
- 4 establish and collect appropriate village membership fees
- 5 secure reliable infrastructure
- 6 continue education of butterfly host plants and growing techniques
- 7 continue education of forest conservation and regeneration



Because of guidance provided at community stakeholder workshops, butterfly farming requires neither land ownership nor formal education. Stakeholder workshops provide a forum for conservation discussion and create farmer networks .



A 2007 study of 150 butterfly farmers revealed no differences in "age, religion, ethnicity, gender, length of residency, adults/incomes in household, or children in household" among butterfly farming participants (Morgan-Brown 2007, 23).



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